SIERRA CLUB BULLETIN.

VOL. II. SAN FRANCISCO, MAY, 1897. NO. 2.

CONIFERS OF THE PACIFIC SLOPE—HOW TO DISTINGUISH THEM.

BY JOHN G. LEMMON.

NO 1.

It is not difficult to distinguish the great classes of plants from each other, or the groups within these classes, if only the attention is directed to certain of their features which are characteristic, ignoring, for the nonce, those they possess in common with others. The organs most relied upon for distinctions are those of the fruit, for this is the product of the supreme effort of the plant. Through life it strives, by various devices, to escape enemies, overcome crowding neighbors, and bring forth its diversified fruit. Locality, also, and characters of the stem and foliage, as well as the microscopical structure, may be useful in determination.

There are about 300 species of oaks on all the earth, but so peculiar is the fruit of the oak—the acorn—that an oak need never be mistaken for other trees. So, too, of other families, the pod-bearers, the grain-bearers, etc.

"Conifer" tells in one word a volume of information concerning a certain very interesting order of plants, which it is the purpose of this article to present and briefly characterize. This will be best done by dividing, first, the great order, then the groups, again and again, giving the chief characteristics of each; then, when the species is reached,

CALIFORNIAN PINE-TRUNKS.
From photographs by John G. Lemmon.

pointing out the most salient and distinguishing characteristics that may enable the reader, with little painstaking, to recognize and hereafter *know* many, if not all, of the sixty-three species of *Coniferæ* of the Pacific Slope.* In this connection, let me call the attention of the reader to the immense preponderance of the cone-bearers in the forests of the great Northwest. Of oaks, ashes, maples, and other broad-leaved trees, we have few distinct groves on this coast, and no large forests,—if we except the few oak groves, several miles in extent, that here and there dot the interior valleys of California,—while nine tenths of the vast mountain forests are composed of narrow-leaved-evergreen, pitch-yielding, and particularly, cone-bearing trees. So, if we learn to know *them*, most of the great forest wealth of Northwest America will be comprehended.

Another consideration: this number of species (sixty-three) is no small part of the world's Conifers, the rest of North America, including Mexico, having little more than half as many (thirty-six), and the broad continent of Eurasia, a region nine times as wide, having only fifteen more (seventy-eight).

If the observer could take in all the cone-bearing forests of the Northwest at one view, examining them at leisure, group by group, he would find them separated by fundamental modes of development into two grand divisions—SPIRALES and VERTICILLATÆ. The largest division, the SPIRALES, develop their leaves and bracts in spirals, or coils, about the branchlets, and the cone scales are similarly coiled about the axis from base to apex. The VERTICILLATÆ, on the contrary, have their foliar and fruit organs arranged in circles about the stem and cone, of two or

* The Pacific Slope (including the enclosed Great Basin) is a naturally delimited region, with the Rocky Mountains for its eastern boundary. Most of its forests are north of the Mexican line. California being but a section of this region, sharing many of its trees with the rest of the slope, it is inexpedient to attempt a description of California Conifers alone.

three members each, rarely of four or six, in a circle, one above the other.

DIVISION I. SPIRALES—SPIRAL-CONE TREES.

Most of the world's cone-bearers being Spirales, we shall gain by studying them first. They divide into three distinct tribes:—

TRIBE 1. ABIETINEÆ.—Very resinous trees, limited to the Northern Hemisphere; further distinguished by being monœcious (male and female flowers on separate branchlets, of the same trees); fruit a woody or leathery cone or bur, with an elongated axis, each scale bearing on its upper surface, two, usually winged, seeds.

TRIBE 2. ARAUCARIEÆ.—Less resinous trees, indigenous to the Southern Hemisphere, and contrarily distinguished by being dicœcious (flowers separated on different trees); the cone-scales bearing each one seed. This tribe being represented here only by cultivated trees, like the "Norfolk Island Pine," "Monkey Puzzle," etc., though useful for comparison, may now be dismissed.

TRIBE 3. TAXODIEÆ.—Still less resinous trees of both hemispheres, are monœcious; cones small; the scales shield-shaped, or club-shaped, not changing direction at maturity, each bearing two to six seeds. Abundant in past ages, only a few species extant now, including our two Sequoias,—to be treated in their order.

TRIBE ONE. ABIETINEÆ—NORTHERN PITCH TREES.

We shall be principally occupied in this paper with presenting the salient characteristics of the northern pitch trees. They are conveniently divided by certain characters of the leaves into two unequal subtribes:—

SUBTRIBE A. FASCICULARIÆ.—Trees with the conspicuous secondary leaves in fascicles, or little bundles of two, three, or five (the pines), or in elongated tufts of twenty to sixty leaves each (the true cedars and larches); cones requiring one or two years to mature.

SUBTRIBE B. SOLITARIÆ.—Trees with all the leaves solitary, not in fascicles or tufted, and all very short—one half to two inches; cones maturing in one season (the spruces, firs, etc.).

SUBTRIBE A. FASCICLE-LEAVED PITCH TREES.

Separated by foliage duration into two classes:—

(*a*) PERSISTENTES.—Trees with evergreen persistent leaves; cones requiring at least two seasons to mature (pines and cedars).

(*b*) DECIDUÆ.—Trees with small, slender, mostly tufted, leaves, on short, spur-like branchlets; maturing their cones in one season; peculiar for their promptly deciduous leaves (the larches).

We come now to the first of the fascicular and persistent-leaved genera.

CLASS A—PERSISTENTES.

FIRST GENUS, PINUS—THE TRUE PINES.

Very numerous species of trees; leaves in fascicles of two, three, or five each (one species single-leaved), sheathed at base with papery scales; fruit a conical, cylindrical, or globular cone or bur, requiring two years to complete its growth (one American species requiring three years); cone-scales with a protuberance (umbo) on the exposed portion (apophysis), either at the apex or on the back; male flowers numerous, spike-like, one half to four inches long, forming a loose rosette near the end, or a ruffle lower down upon the male branchlets. Separated chiefly by characters of the wood into two subgenera.

SUBGENUS I. STROBUS — *The Soft-wood or White Pines.*—Trees with the apophysis of the cone-scale thin, the umbo at the apex, and devoid of a prickle; leaves short and always in fives, their sheaths loose and deciduous.

SUBGENUS II. PINASTER — *The Hard-wood Pines.*—Trees with the apophysis enlarged, the umbo on the back, in most species terminating in a prickle or stronger spine; leaves variable in number, usually long.

SUBGENUS I. STROBUS—SOFT-WOOD OR WHITE PINES.

These comprise the largest and most valuable pines in the world, most of them in Northwest America. Bark thinnish, finely checked; wood soft and white; foliage light green; leaves always in fives. Five species in two groups:—

I. ELONGATÆ—*Long-cone Lumber Pines.*—Very large and valuable trees, affording long shafts for lumber; cones pendent, cylindrical, 8 to 26 inches long; three species.

II. ALPINÆ—*Alpine Pines.*—Small, often depressed, Alpine or sub-Alpine trees, on certain limited elevations.

GROUP I. ELONGATÆ—LONG-CONE PINES.

Chief of the Long-cone White Pines is the chief of all the family of pines,—

1. *Sugar Pine* (*Pinus Lambertiana*). — No one who, even from the window of a fast-flying railway train, has ever seen this majestic tree with its enormous, smooth trunk towering aloft, and suspending with long outreaching upper limbs, its matchless cones, like brown Chinese lanterns, will ever forget the sight. The trees are of the largest dimensions, often attaining a height of 200 to 300 feet, with a diameter of ten to fifteen feet. Cones usually bronze-green until ripe, two to three inches thick until opened, then four to six inches in diameter and ten to twenty-six inches long — the longest in the world. The

Sugar Pines never form exclusive forests, but are scattered among other trees at middle elevations of the Sierra, Coast, and Southern Cascade ranges. Its nearest relative is,—

2. *Arizona White Pine* (*P. strobiformis*).—Large trees, found on the highest mountains of Arizona and New Mexico, distinguished by the elongated spoon-shaped cone-scales, the cones being two thirds the size of those of Sugar Pine. The third species of the Long-cones is,—

3. *Mountain Pine.* (*P. monticola*).—Small light-barked trees of sub-Alpine altitudes, rare in the Sierra, northward to the mountains of Oregon and Washington, eastward to Montana, where it forms quite extensive forests; distinguished by its smaller and narrower cones, six to twelve inches long, the scales thin, weak, usually reflexed at maturity.

GROUP II. ALPINÆ—ALPINE WHITE PINES.

Small, often depressed trees, on peaks of the southern Rocky Mountains and Great Basin region. Cones small, oblong, or ovate. Two species:—

4. *Rocky Mountain White Pine* (*P. flexilis*).—Standard or sometimes depressed trees of Colorado peaks, extending to the mountains of Nevada, Northern Arizona (a large-cone variety), and the Central Sierra; branches slender; cones oblong, four to six inches.

5. *White-bark Pine* (*P. albicaulis*).—Very white-barked, sturdily erect at sub-Alpine localities in the northern Rocky, the Sierra, and Cascade Mountains, or depressed to solid platforms in the high passes; cones ovate, two inches long, set close upon the short, stout, erect, white, annual stem; seeds globular, wingless.

SUBGENUS II. PINASTER.—HARD-WOOD PINES.

Taking up the Hard-wood Pines, we find a much larger subgenus, of species variously grouped, first dividing

according to position of male flowers and the cones into two sections, viz:—

SECTION 1. TERMINALES—with the flowers and cones arising just below the leaf-buds;

SECTION 2. LATERALES—with these organs arising on the side of the growing shoots of the season, some distance below the terminal bud.

SECTION ONE. TERMINALES.—TERMINAL-CONED PINES.

Nineteen species, separated by characters of the leaves and cones into two sub-sections: (*a*) *Brevifoliæ*,—with very short leaves, one to two inches long, their sheaths deciduous in the first two groups of the section; and (*b*) *Fracticonæ*,—cones breaking from the stem by a transverse fracture through the base of the cone; sheaths persistent.

Sub-section A. Brevifoliæ—Short-leaf Pines.

Usually small trees, with small cones and male flowers. Three very diverse groups:—

III. PLUMOSÆ—*Plume-branched;*

IV. EDULES—*True Nut Pines;*

V. PARVICONÆ—*Thimble-cone Pines.*

GROUP III. PLUMOSÆ—PLUME-BRANCHED PINES.

Branchlets plume-like, outreaching, or descending, bearing pendent near the ends the small oblong or elliptical cones; leaves in fives. Two species:—

6. *Balfour Pine* (*P. Balfouriana*).—Very rare trees of limited numbers, sequestered on certain slopes of Mount Eddy, near Mount Shasta, and upon the slopes of Mount Whitney and neighboring peaks; cones narrowly elliptical, three to four inches long, the scales comparatively soft, the prickles minute.

7. *Foxtail Pine (P. aristata).*—Similar, but larger trees, on the highest mountains of Nevada, Southern Utah, Colorado, and southward to New Mexico and Arizona, with a few on the Panamint Mountains of Southeastern California; cones smaller, nearly cylindrical, the scales harder, with slender, half-inch, bristle-like prickles.

GROUP IV. EDULES—TRUE NUT PINES, OR PIÑONS.

Natives of hot interior regions, from Nevada and Colorado to Sonora. Trees rounded in outline; the foliage heavy-scented; leaves in fascicles of one to five, are white-lined above with *stomata* (breathing pores); cones small, globose, stemless, hence promptly crowded off at maturity; cone-scales widely opening at maturity, are few in number, the umbo usually very protuberant, but devoid of prickles; seeds large, wingless, edible. Four closely related species in two pairs—American and Mexican:—

1st Pair. American Nut Pines.

Largest of the nut pine trees; cones slightly elongated, one to two inches long; seeds soft-shelled. Two species, so closely connected that some observers think them forms of one species, and in that case they bear the name of the first mentioned below.

8. *Single-leaf pine (P. monophylla).*—Usually small, round-headed trees, but in the Tehachipi Mountains becoming tall and slim, thirty to fifty feet high, with a diameter of two to three feet; headquarters on the mountains and hills of the Great Basin, they reach the foothills of the Southeast Sierra, extending sparsely southward to the mountains of Southern California, and eastward to northern Arizona; cone largest of the nut pines, one and one half to two inches long, the scales with large quadrangular umbos, one quarter to three eighths inches high; peculiar for its robust, sharp-pointed leaves, which are usually solitary, yet always, while young, sheathed at base like a fascicle.

9. *New Mexican Piñon* (*P. edulis*).—Very small, globe-headed trees, only a few feet high, on the plateaus of New Mexico, extending sparsely northward to Colorado, westward to Arizona, and southward to western Texas; leaves very slender, in twos; cones smaller, the axis so short that when the cone opens it becomes a flat rosette, scales with less prominent umbos. The soft-shelled delicious seeds are a staple article of diet for the natives, and many tons are exported annually.

2d Pair. Mexican Piñons.

These species, though composed of similar, small, rounded trees, differ materially in habitat and in the leaves and seeds.

10. *Parry Nut Pine* (*P. quadrifolia*, until recently called *P. Parryana*).—Trees with cones one to two inches long, the umbos very prominent; seeds soft-shelled; the leaves, at first thought to be in fours, are mostly in fives, and very robust; headquarters on the San Rafael Mountains of Lower California, extending sparsely northward into the mountains back of San Diego.

11. *Stone-seed Piñon* (*P. cemproides*).—Small trees of Northern Mexico, extending sparsely into Arizona; cones very small, opening like those of *P. edulis*, an inch thick, scales few, with slightly elevated umbo. Trees peculiar for their large, hard-shelled seeds, forming a popular Mexican diet. The leaves are very slender, and mostly in threes.

GROUP V. PARVICONÆ—THIMBLE-CONE PINES.

Usually small trees; the cones often persistent for many years, very small, one half to two inches long, slender, narrowly elliptical until opened, and armed with small incurved prickles; seeds very small, narrowly winged; leaves in pairs. Two closely-allied species, by many observers considered as one, and in that case called by the name of the first species following.

12. *Twisted Pine* (*P. contorta*).—Often small, scrubby, wind-depressed trees, on the northwest coast, the southernmost at Mendocino, often attaining a height of thirty to fifty feet, with a thick-barked trunk, two to three feet; extending northward, with smaller forms, to Alaska, and, it is thought, eastward to Idaho and Montana; cones varying from one half inch long in Alaska to one and one half inches in lower latitudes. A dwarfed form on the Starved White Plains, near Mendocino, begins to bear at one foot high.

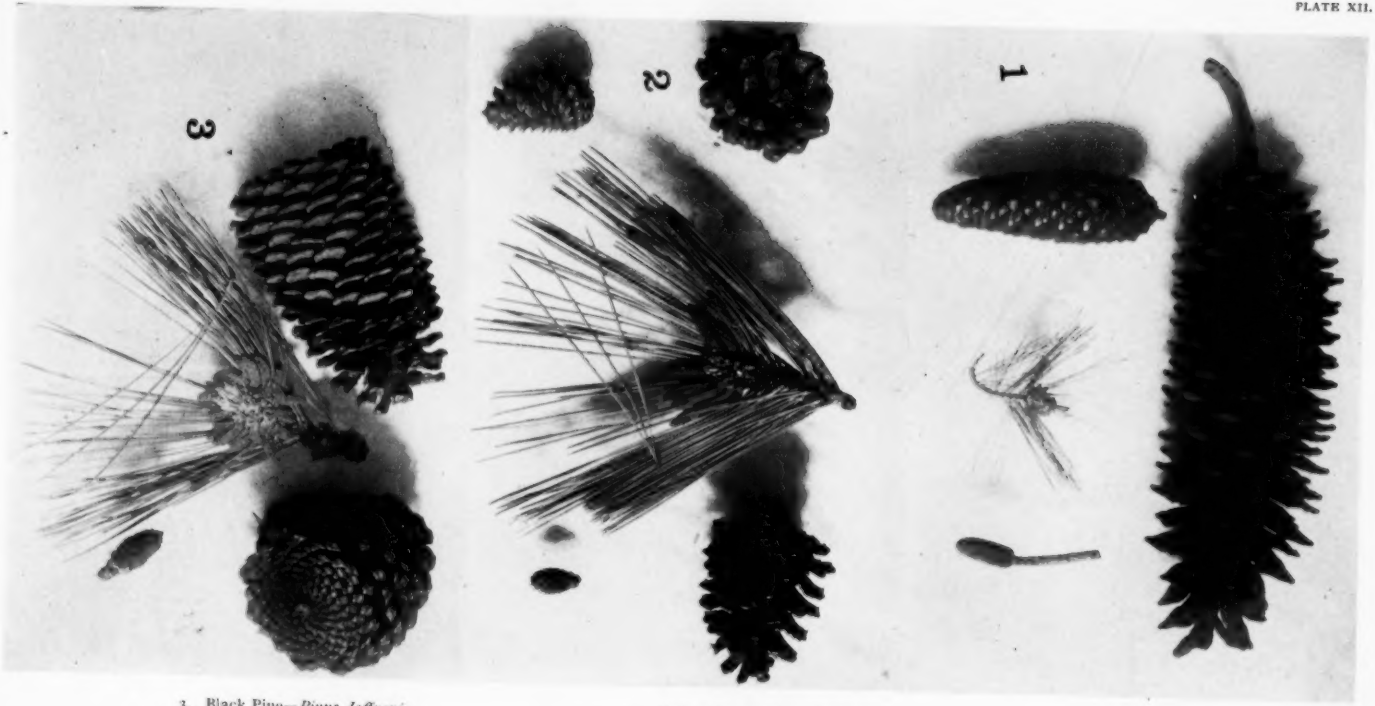
13. *Tamarack Pine* (*P. Murrayana*).—Usually slender trees, of sub-Alpine, wet places, found especially northward in the mountains of Oregon, Washington, Idaho, Montana, and British Columbia, where it is often called "Lodgepole Pine," but southward on the Sierra of California, becoming large trees, three to five feet in diameter, though the hard, outer bark will be but one quarter to one half inch thick, resembling that of Eastern and Old-World Tamarack. Smaller forms also in the highest mountains of Arizona to northern Mexico. Wood singularly light-colored; cones larger, one and one half to two and one half inches long.

Sub-section B. Fracticonæ—Broken-cone Pines.

Usually large and valuable lumber trees, of wide distribution; cones ovate-conical, four to eight inches long, peculiar for the manner in which they break away from the limb by an irregular transverse fracture within the base, leaving the undeveloped scales on the limb; seeds with long wings, widest above; leaves mostly in threes, five to eight inches long. Two groups:—

GROUP VI. COMMUNES—COMMON LUMBER PINES.

Large trees of middle altitudes, from British Columbia southward, on the principal ranges, to Arizona, eastward to the Black Hills of North Dakota. Two species:—



3. Black Pine—*Pinus Jeffreyi.*

2. Yellow Pine—*Pinus Ponderosa.*

1. Sugar Pine—*Pinus Lambertiana.*

CALIFORNIAN PINE-CONES.

From photographs by John G. Lemmon.

14. *Western Yellow Pine* (*P. ponderosa*).—Trees of the largest size, attaining on the Sierra a height of 200 to 300 feet, with a diameter of ten to fifteen feet; bark in the typical form, yellowish or whitish, mostly very thick and deeply fissured into large, longitudinal plates; cones conical-ovate, three to five inches long; male flowers flexuous, and peculiar for their great length, three to five inches long, forming large rosettes about the bud or the few leaves at the ends of the male branchlets. One of the "polymorphous" species, probably divisible into several. One form (variety *nigricans*), with dark brown bark, which is thinner and more finely checked; the trees smaller, sap-wood of many layers; the limbs usually retained longer than those of the yellow-barked trees—is found bordering the yellow pine forests of the Sierra; and southward, on the Colorado plateau of Arizona and New Mexico, it forms the most of a large pine forest. A second well-known form, in my opinion, is entitled to rank as a good species, to wit:—

15. *Rocky Mountain Yellow Pine* (*P. scopulorum*). *N. Sp.*——. Small trees, spire-like in outline, with grayish bark, and with smaller cones and harder scales; the foliage more scanty, leaves inclined to be tufted near the ends of the branchlets, usually in threes, but often in twos. Mountains of Colorado, westward to Nevada, and eastward to the Black Hills of North Dakota.

16. *Black Pine* (*P. Jeffreyi*).—Large trees, affecting, usually, more elevated localities than *ponderosa;* bark dark brown, finely broken into small squares; limbs long and spreading; young branchlets and leaves when bruised exhale a pleasant orange-like fragrance; cones large, ovate, six to ten inches long; umbos prominent, with strong, recurved prickles; seeds large, with expanded wings, one half to one inch long; male flowers robust, short, one to two inches long. Western Montana, through Idaho and Oregon,

southward to California, along the Sierra, to the mountains of Southern California; perhaps to Lower California, but the type there (variety *Peninsularis*) forming a large forest on the San Rafael mountains, of spire-shaped trees, with thick, coarsely checked bark, the cones large, very abundant, with hard, dark-colored scales; leaves large, eight to twelve inches long; bud-scales scarious, lacerate, with whitish hairs—may be entitled to specific rank.

GROUP VII. NOVITATES—ARIZONA BROKEN-CONE PINES.

Two little-known species on the mountains of Southern Arizona and Northern Mexico.

17. *Arizona Pine* (*P. Arizonica*).—A middle-sized tree; attaining forty to sixty feet, on the highest peaks, from the Santa Catalina Mountains southward to Chihuahua. Peculiar in having its leaves in fives.

18. *Broad-leaf Pine* (*P. Mayriana*, until recently *P. latifolia*).—Medium sized trees, with leaves and bud-scales similar to those of the Peninsular Pine; cones ovate, oblique, three to five inches long, the scales with recurved mammillary umbos, tipped with slender prickles. Santa Rita and Huachuca Mountains of Arizona. Perhaps includes the form on the Chirricahua Mountains (*P. Apacheca*), with smaller cones, and fewer scales, the apophyses of the cone-scales prominently elevated, but not recurved, the umbo quadrangular, armed with a stout prickle.

SECTION TWO. LATERALES—LATERAL-CONED PINES.

Cones and male flowers arising laterally, i. e. along the growing stems at some distance below (later than) the first leaves of the season; cone-stems very strong, aiding in retaining the cones, often for a long period, on the trees. Six species in two groups, the Heavy-cone Pines and Persistent-cone Pines.

GROUP VIII. GRAVICONÆ—HEAVY-CONED PINES.

Cones of the heaviest and hardest description, usually in whorls or circles of three or more, with thick, stout stems, two, four, or even six inches long. Although the cones usually open at maturity, releasing the very large seeds, they remain on the tree until forced off by the growth of the bark and wood after the lapse of four to eight years, according to length of stem.

19. *Torrey, or Lone Pine* (*P. Torreyana*)— Limited to a few, sturdy, storm-beaten trees on the beach, twenty miles north of San Diego (with a few more on the outlying Santa Rosa Island). The cones mahogany-brown, hard as knobs of hickory, persisting for about four years, are nearly hemispherical, with few broad scales, bearing very hard-shelled seeds, three fourths of an inch long and half as thick — the largest known; the wing abreviated to a thick clasping pair of clips holding the seed. Peculiar for these characters of the cone and seed, and for the great size of its leaves, which are always in fives, and eight to twelve inches long.

20. *Big-cone Pine* (*P. Coulteri*).— Trees of medium size, with long spreading branches, the branchlets of the season very stout, to support the immense cones; these elongated, elliptical, of matchless size and weight, fifteen to twenty inches long, and often attaining eight to ten pounds; the scales are very large and thick, the umbo greatly enlarged, and with its long, stout, curved spine, becoming a stout hook; the hooks on the outer side, near the base, being two to four inches long. Seeds half an inch long, with very large wings, an inch long; foliage dark green, abundant, the leaves in threes, large and long, ten to sixteen inches. On the southern coast mountains, from San Luis Obispo east to San Bernardino, and south to highest peaks near San Diego.

21. *Gray-leaf Pine* (*P. Sabiniana*).—Usually small, round-headed, freely-branching trees of the hot interior foothills bordering both the Sierra and Coast Mountains, from Shasta to Southern California, eastward to near Yosemite; the scant foliage of a striking grayish color, leaves in threes, all but those of the season drooping or early falling; cones dark brown, broadly ovate, weighing two to five pounds, armed with stout, short hooks, one half to two inches long; seeds, as in the Torrey Pine, very large, with a thick, hard shell. Peculiar for the light-colored foliage, the trees resembling clouds or fog banks in the distance.

GROUP IX. TENACES.—PERSISTENT-CONE PINES.

Completing the many groups of pines is the quartette of Tenaces, those small trees whose cones are produced annually in circles about the stems (or singly in the last species), mostly not falling at maturity, but remaining fastened by their stems to the tree, also generally remaining closed for a long period. Most familiar is the,—

21. *Monterey Pine* (*P. radiata*).—Indigenous to the Monterey coast, but popular in cultivation. The trees are peculiarly marked by characters of the oblique-ovate cones, whose scales at base, on the outer side, swell out into nearly hemispherical tubercles, or knobs, one quarter to one half inch high. The cones are generally held fast by the tree during its life; trees four and five feet in diameter may be seen on Point Pinos, still retaining every cone they have produced, circling the trunk and limbs from base to apex. Of course, the lumber is perforated with holes,—the channels formed by the cone-stems on their many years' journey from heart to bark.

22. *Swamp Pine* (*P. muricata*).—Small trees in scattered groves, often in wet places along the coast from Lower California to Mendocino, where it becomes a tree similar in

appearance to the Monterey Pine, but with excessively thick bark for trees of its size, four to six inches thick on trees but eighteen inches in diameter; cones small, oval, two to three inches long, armed with strong, sharp prickles. A peculiarity is in the leaves, which are in pairs, though very long, four to eight inches.

23. *Knob Cone Pine* (*P. attenuata*).—Usually slender trees, in groves scattered on sunny slopes, from Idaho to Southern California; cones narrow, four to seven inches long, in whorls, or circles, generally declined, often incurved, attenuate toward each end, outer scales with conical, quadrangular protuberances, and short prickles. A peculiarity of this tree is the tapering character of its cones at base, whereby they oppose so little resistance to the growing trunk that often, instead of being crowded off, they are seized by the first encroaching wood-layers, and finally enveloped completely. Examples may be seen in the Berkeley arboretum.

25. *Chihuahua Pine* (*P. Chihuahuana*).—Small, often decrepit, trees of Southern Arizona and Northern Mexico; leaves in threes, slender, three to six inches long, whitened above, the sheath of long, shining, loose, soon-falling bracts; cones (requiring three years to complete growth) small, top-shaped, one and a half to two inches long, persistent for many years. This tree is peculiar in America for its three-year cones, and among the Laterales for the promptly deciduous sheaths of its leaves.*

[GENUS CEDRUS.—TRUE CEDAR.

Historic trees of the Orient, known by their few, large, long-spreading branches, dense foliage of short, one half to

* The only other three-year pine is *P. pinea*, the Stone Pine, the classic pine of Greek and Roman writers, a small, round-headed tree, much in cultivation, with its long leaves in pairs; cones large, ovate, five to six inches long, mahogany-colored, the thick scales with rounded umbos, and large blue seeds.

two-inch leaves, mostly in tufts of thirty to sixty, on short spurs; cones biennial, erect, large, nearly cylindrical, two and a half to four inches long, with many close-packed smooth scales. Three species, often met with in cultivation. The salient characters of the true cedars are here mentioned, that they may be compared with those of the so-called cedars of America.]

CLASS B. DECIDUÆ.—THE DECIDUOUS-LEAVED FASCICULARS.

Trees with small, slender leaves, mostly tufted on the ends of short undeveloped spurs, peculiar for being promptly deciduous; hence, the trees are naked for a large portion of the year. Cones, maturing in one season, are small, narrowly elliptical, one to two inches long, pendent from the sides of the previous season's growth. Two genera, *Larix* and *Pseudolarix*. The former only represented in America.

SECOND GENUS. LARIX.—THE LARCH.

In America, usually small trees, called by the aboriginal name of Tamarack. Two species of the far northwest.

1. *Western Larch* (*L. occidentalis*).—Often attaining a large size, eighty to one hundred feet high and three to four feet in diameter. This species is scattered through the Selkirk and Gold ranges, and southward sparsely on the Rocky Mountains, and the Cascades to Mt. Hood. Peculiar for its very thick, spongy bark, resisting the first kindling of forest fires.

2. *Woolly Larch* (*L. Lyallii*).—Small Alpine trees, rare in the northern Rocky Mountains, westward to the Galton and Cascade ranges. Cones deciduous, and with the branchlets clothed with whitish hair.

(Concluded in next number.)

GENERAL CLASSIFICATION OF THE PACIFIC SLOPE CONIFERS.

ORDER CONIFERÆ—CONE-BEARING TREES.

DIVISION I. SPIRALES—SPIRAL-CONED CONIFERS. Leaves and cone-scales in spirals.

TRIBE 1. ABIETINEÆ—Northern Pitch Trees.

FASCICULARIÆ.

Evergreen.

1. *Pinus* ..... Pines.
(*Cedrus*. True Cedar—Oriental.)

Deciduous.

2. *Larix* ..... True Larch.

SOLITARIÆ.

Pendentes.

3. *Picea* ..... True Spruce.
4. *Tsuga* ..... Hemlock Spruce.
5. *Pseudotsuga* ... False Spruce.

Erectes.

6. *Abies* ..... True Fir.

TRIBE 2. ARAUCARIÆ. Southern Pitch Trees.

(*Araucaria*, etc.) Norfolk Island Pine, etc.

TRIBE 3. TAXODIEÆ THE TAXODIADS.

Pygmææ.

(*Athrotaxis*, etc.) Tasmanian.

Gigantes.

(*Taxodium*—Bald Cypress.) Atlantic and Mexican.

7. *Sequoia* ..... Redwoods.

DIVISION II. VERTICILLATÆ—WHORL-CONED CONIFERS. Leaves and cone-scales in whorls.

TRIBE 1. CYPRESSES AND ALLIES.

American Cedars.

8. *Thuya* ..... Arbor Vitæ.
9. *Libocedrus* ..... Incense Cedar.

Cypresses.

10. *Chamæcyparis* .. Cypress.
11. *Cupressus* ..... True Cypress.

TRIBE 2. TRUE JUNIPER.

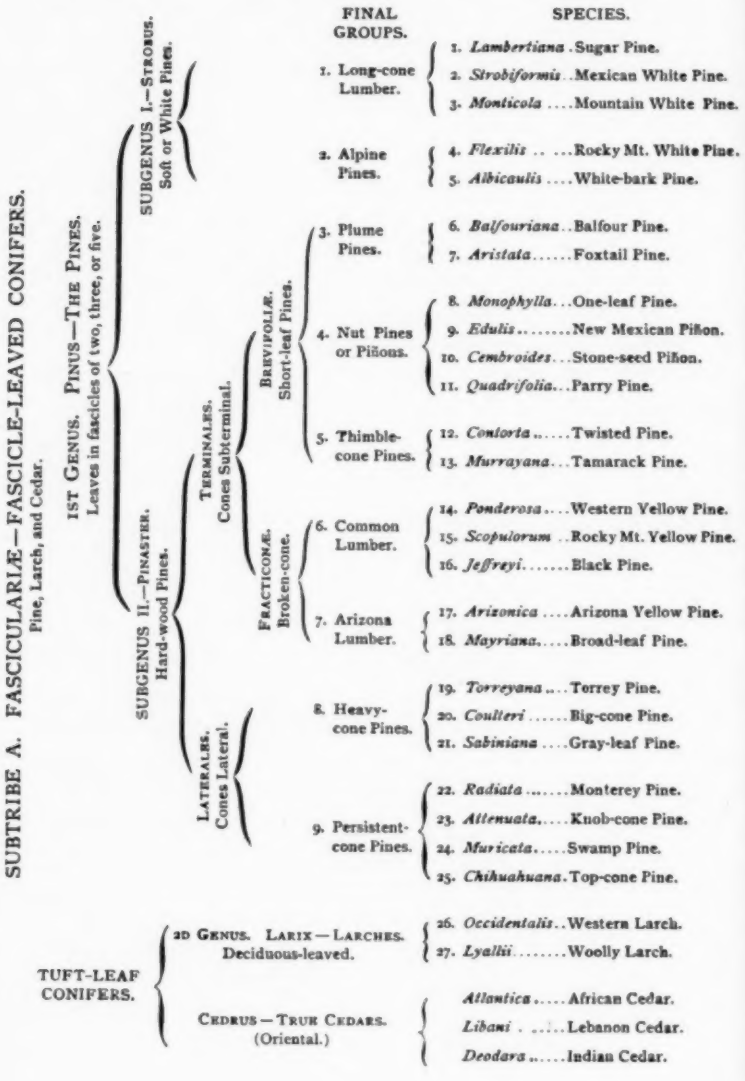
12. *Juniperus* ..... Juniper.

ORDER TAXACEÆ—DRUPE-FRUITED TREES.

13. *Tumion* ..... Nutmeg.
14. *Taxus* ..... Yew.

GENERA, On Pacific Slope, numbered.

CONSPECTUS OF PINES, LARCHES, AND CEDARS.


FINAL GROUPS.
SPECIES.
SUBTRIBE A. FASCICULARIÆ—FASCICLE-LEAVED CONIFERS.
Pine, Larch, and Cedar.
1ST GENUS. PINUS—THE PINES.
Leaves in fascicles of two, three, or five.
SUBGENUS I.—STROBUS. Soft or White Pines.
SUBGENUS II.—PINASTER. Hard-wood Pines.
TERMINALES. Cones Subterminal.
LATERALES. Cones Lateral.
BREVIFOLIÆ. Short-leaf Pines.
FRACTICONÆ. Broken-cone.
1. Long-cone Lumber.
1. Lambertiana . Sugar Pine.
2. Strobiformis . Mexican White Pine.
3. Monticola . . . . Mountain White Pine.
2. Alpine Pines.
4. Flexilis . . . . Rocky Mt. White Pine.
5. Albicaulis . . . . White-bark Pine.
3. Plume Pines.
6. Balfouriana . . Balfour Pine.
7. Aristata . . . . . Foxtail Pine.
4. Nut Pines or Piñons.
8. Monophylla . . . One-leaf Pine.
9. Edulis . . . . . New Mexican Piñon.
10. Cembroides . . . Stone-seed Piñon.
11. Quadrifolia . . . Parry Pine.
5. Thimble-cone Pines.
12. Contorta . . . . . Twisted Pine.
13. Murrayana . . . Tamarack Pine.
6. Common Lumber.
14. Ponderosa . . . . Western Yellow Pine.
15. Scopulorum . . Rocky Mt. Yellow Pine.
16. Jeffreyi . . . . . Black Pine.
7. Arizona Lumber.
17. Arizonica . . . . Arizona Yellow Pine.
18. Mayriana . . . . . Broad-leaf Pine.
8. Heavy-cone Pines.
19. Torreyana . . . . Torrey Pine.
20. Coulteri . . . . . Big-cone Pine.
21. Sabiniana . . . . Gray-leaf Pine.
9. Persistent-cone Pines.
22. Radiata . . . . . Monterey Pine.
23. Attenuata . . . . . Knob-cone Pine.
24. Muricata . . . . . Swamp Pine.
25. Chihuahuana . Top-cone Pine.
TUFT-LEAF CONIFERS.
2D GENUS. LARIX—LARCHES. Deciduous-leaved.
26. Occidentalis . . Western Larch.
27. Lyallii . . . . . Woolly Larch.
CEDRUS—TRUE CEDARS. (Oriental.)
Atlantica . . . . . African Cedar.
Libani . . . . . Lebanon Cedar.
Deodara . . . . . Indian Cedar.

BULLFROG LAKE.
From a photograph by J. N. Le Conte.

UP AND DOWN BUBB'S CREEK.

By Helen M. Gompertz.

[In this short account of a summer outing, there is little room for details. We took such food as was easily packed on burros, nevertheless allowing ourselves some of the best canned fruits and vegetables, by way of variety.

If there be room in the pack, onions, potatoes, and desiccated soups are easily carried.

Any information about the quantity of food, or about suitable clothing, can best be given to any one interested in a similar trip upon addressing me at Berkeley.]

A walk of thirty miles from Millwood, Fresno County, brought us to camp under the shadow of "The Grand Sentinel," in King's River Cañon. Blocking the upper end of the cañon stands Glacier Monument, obstinately rearing its stately pyramid in the background of every river scene. One might as well expect to see Sahara without its pyramids, as King's Cañon without the monument. The party, numbering Mr. J. N. Le Conte, Mr. and Mrs. W. S. Gould, the Misses Miller, and myself, stayed long enough in the cañon to take short trips to points of interest: up Paradise Cañon, to the top of Grand Sentinel, and to the summit of Goat Mountain (12,500 feet). Others have already called attention to the fine panoramic view of the whole Sierra uplift from this peak, and our subsequent trips to higher mountains in no wise interfered with the verdict that the Goat Mountain view is unsurpassed in its kind. It is within such easy reach of the cañon, that all should make the ascent.

On our return from a three days' trip to this mountain, we spent some time in considering the weighty question of

From a photograph by J. N. Le Conte.

how to make our packs light enough for two small "burros" to carry up Bubb's Creek. Our supplies had been brought in by pack train, and now the problem was, to take enough for a two weeks' stay. To economize in weight, down quilts and light blankets were found very suitable. As to other baggage, if one be a woman, she will feel a glow of pride in the thought of doing her best to rough it, whilst she packs into a bag things that seem impossible to be without. This is a safe way of bestowing them, because at the last moment a handful of anything will be snatched from the top, and the rest left behind in the bag. Strange to say, no afterglow of satisfaction follows this sacrifice.

But like war-horses that scent the smoke of battle from afar, the dust of Bubb's Creek trail lured us on, and all small vexations were forgotten in the pleasure of viewing the unfolding beauty disclosed at every turn of the narrow gorge. Its sides were bare and precipitous, but the dark polished surface served as a foil to the tumbling white torrent, whose playful leaps gave small hint of the force that had worn for it its way into the very heart of the rock. Not a good word can be said for the trail that climbs along this rocky wall, but in deference to my readers, the bad ones will be omitted. Our route followed the old Independence Trail, up Charlotte Creek to Lake Charlotte. Before reaching the latter, a stop of one day was made for the ascent of Mt. Gardner (13,200 feet).

The climb was begun from an altitude of 8000 feet, just behind Granite Dome, and proved to be quite easy to the lower summit of the double peak. It was a most impressive moment, when, having climbed slowly and laboriously over a steep bowlder mass, we suddenly came to the top, and looked over the sheer, dark cliff, a depth of 1500 feet. For days we had looked up at its frowning wall of cold, gray granite, and now to be leaning over its edge and gazing down its awful depth seemed a triumph indeed. The great

SUMMIT OF MT. GARDNER
From a photograph by J. N. Le Conte.

UNIVERSITY PEAK.
From a photograph by J. N. Le Conte.

cliff forms a re-entrant angle, and we stood on one side of the angle, looking across at the true summit on the other side. Here we met Professor Brown, who followed Mr. Le Conte on to the summit. They found that the north side of the mountain also fell away in a sheer cliff, so that they must cross a sort of "knife-edge" to gain the topmost point. To those watching there came a moment of dreadful anxiety, when, the "knife-edge" safely passed, the climbers disappeared behind a huge square rock. For at that same moment an unseen bowlder crashed down the mountain side, and who could say that our friends were not carried with it? In a few moments, lengthened into hours by suspense, they re-appeared, and this time on the hitherto untrodden summit of Mt. Gardner.

Miss Belle Miller followed them, creeping, step by step, along a narrow ledge on the face of the cliff. When she reached the "knife-edge," which, to increase the danger of crossing, dipped down at a considerable angle, she paused, and wisely went no further. She was then but a few feet below the summit, and deserves the credit of having dared thus far. For myself I reserved the harder (?) task of watching one after another of my friends in such perilous positions. From my post of observation, they seemed to be clinging, like flies, to the cliff itself, and my fears for their safety increased with each step that bore them further from me.

Presently, Miss Miller returned, and together we watched the others hurl down a bowlder or two, in order to place the tripod firmly. The tiny space thus cleared gave room for nothing but the camera, and every time that the shutter was to be adjusted, or the cap removed, Mr. Le Conte had to crawl through, between the tripod legs, and back again. This acrobatic performance reminded us forcibly of the man of whom it was said, that "he crawled through himself, swallowed himself, and smiled with the greatest agility."

Far and near stretched a veritable sea of mountains, their sharp crests overtopping the general mass in long wave-like lines. Toward the southwest a tiny white cloud appeared, and from that grew an ominous black one, that shrouded Mt. Brewer in its folds. From our sunny eminence, we watched the storm burst and show glimpses of that weather-beaten summit upon which we yet hoped to stand. As time passed, the blackness fell over us, too, and all unwillingly we heeded the warning of each approaching thunder-clap. Plunging down the mountain side, we were soon in the midst of a smart hailstorm. It being too near the summit for shelter, we kept on our way, and in an hour or two had walked ourselves dry, and found our way again into the land of summer.

Speaking of summer, calls to mind the current saying, that at this season it never rains in the Sierra. In the present case the frequent thunder showers were much enjoyed, but we soon found it convenient to organize a storm brigade, that should put all things under cover before the first big drops had fairly fallen. Then we ourselves would seek shelter under some big fir-tree, and from beside a huge camp-fire watch the war of the elements. But when it fell to raining a dull, steady downpour, the seat of war was changed. Our wrath rose with the floods, and when night brought no cessation, it was far from soothing to lie under a rubber blanket and listen to the patter of the raindrops. When the blanket seemed to be getting heavy, the monotony was varied by draining off the numerous lakes formed in its depressions, and trying it again. Of course, it was camp etiquette to declare that one had slept like a log all night. But at this safe distance, in time and space, I may say, that "water-logged" would have described our condition better.

A day or two later found us camped at the foot of University Peak, just west of Kearsarge Pass. A stormy

day was followed by an evening calm, and then it was our good fortune to see the sunset light redden the sharp pinnacles which formed the western spur of the dominant peak. We watched the jagged reflections in the chain of gem-like lakes at their base. Not a ripple marred the mirror calm of the water. It glowed with colors—amethyst, violet, deep purple, and then grew black and starry with the sky—a good omen for the morrow's climb to University Peak.

At dawn we were breakfasting on rainbow trout and cornmeal dodgers. This important ceremony over, we set our faces toward the east, where our Mecca rose in bold outline against the clear morning sky. The day before, we had viewed it from Kearsarge Pass, whence it shows a forbidding cliff, which seems fairly to overhang and guard this gateway to the east.

From the west, however, our way led over rough talus piles at the foot of the pinnacles, past a little frozen lake, then across some snowfields, onward, up a steep slope of coarse, loose, disintegrated granite, mixed with bowlders of various sizes. These, as well as the sand, were set in motion at the slightest touch, and, much to our dismay, each upward step seemed to carry us downward. With much murmuring and vexation of spirit, we finally reached the notch in the pinnacles at which we had been aiming, and after that, finding the slope much gentler, it was easier to keep one's footing. We had now skirted the mountain to its southern face, quite opposite to the precipice. The sky was cloudless, a cool breeze blowing, and although we stopped often to rest and to enjoy the prospect, we yet reached the top quite easily.

We were now at last on the main crest of the Sierra. From an elevation of 13,900 feet we looked down the eastern face of the range into Owen's Valley, 9000 feet below. Anon we traced the crest-line, from Mt. Goddard on the

north to the Whitney region on the south. Mt. Williamson lay near us, Mt. Tyndall further south. Between us and Williamson was a lofty mountain yet unnamed, to which we gave the name of Mt. Keith, in honor of Mr. William Keith.

After many days of seeing nothing but mountains, we could turn, with a feeling of enjoying a new sensation, to look upon the wide valley far below. A wavy line marked the Owen's River; a dark shadow, the trees and town of Independence. So clear was the atmosphere, that two elliptical forms faintly traced on the plain we made out to be the race tracks near the town. We had heard much of the "White Sage Honey" of Independence, and, after noting the tracks, quite hoped to see the beehives, and hear the "drowsy hum of insects."

With a turn of the glance, all these petty worldly things were put aside, and we were again amid our wild accustomed haunts. Thirty beautiful lakes were counted from this point, some shining out of carved bowls on high rocky shelves, others nestling in the green hollows below.

Mt. Brewer, crowning the Great Western Divide, bared its snowy bosom to the sunshine. Bathed in light, it no longer looked forbidding, but lay beyond us like "the promised land."

Before leaving the summit, Mr. Le Conte built a small monument, and left beneath it a can containing the names of the members of the party; also an account of the naming of University Peak, in 1890, by a party of California students, who viewed it on its inaccessible side from Kearsarge Pass. The ascent here recorded is supposed to be the first, and was made on July 12, 1896.

In the course of conversation, I once heard Mr. John Muir remark, that he disliked to waste a starry night in sleep when he might be, instead, on the mountains. I now recall the strong desire I felt to stretch myself on the warm

rocks and spend the night on the summit. But I can lay no claim to having done more than *desire* it, for the thought of a good dinner and one of Mr. Gould's inimitable campfires, soon sent us clambering down the bowlder pile and speeding along the slopes, glad that at each step we slid down quite a little distance nearer home. The next day, being Monday, we devoted to fishing, cooking, and mending.*

With many camping parties the subject of the menu is a vexed question. We found that the succulent flapjack and the filling corndodger palled at times upon our jaded appetites; so, armed with a supply of Magic Yeast, and trusting to our Dutch oven, we dared the mysteries of real bread. Perhaps it was the "magic" in the yeast that crowned our efforts with success, but be that as it may, housekeepers will appreciate our daring when they remember that we were camped at a considerable altitude, and had to contend with frequent changes of temperature, besides thunderstorms of several hours' duration. I recall my first attempt at camp bread with mingled emotions. Early one bright, hot morning, I mixed my "sponge," and wrapping the basin tenderly in a heavy, red blanket, set it to rise, in a sunny place among the rocks. I moved it with the sun, and peeped under the red blanket to see if the dough had commenced to work. But no bubbles showed on the surface, and I despaired of ever seeing it rise. Later in the day a splendid thunderstorm broke over us. The bread must be kept warm at all costs. I had heard that the Russian peasants took theirs to bed with them, but having no bed to take mine to, I doubled the red blanket and placed the unleavened mass in the warm ashes near the campfire. Thoroughly disgusted with the results of my

* In the afternoon, Mr. Gould and Mr. Le Conte climbed a fine peak north of Kearsarge Pass. Two days before, they had also made the ascent of a mountain to the south of Lake Charlotte, which gave a fine outlook toward East Lake and Mt. Brewer.

labor, I gave myself up to enjoyment of the storm. Judge of my surprise when, some hours later, it was discovered that the bread had risen! It was near nightfall, but that bread must be kneaded, set to rise again, and baked before we "turned in." The baking was usually done by Mr. Le Conte, whose skill in manipulating a Dutch oven is only equaled by his dexterity in "flipping the flapjack." Finally, when the crisp brown loaves were turned out, and our nostrils assailed by their delicious odor, no trouble seemed too great for the result.

Necessity caused us to devise various modes of cooking the scant variety of staples at hand, and though we cannot boast of ascending mountain peaks before breakfast, we can recall with pride the savory surprises that Mrs. Gould hid under cover of the Dutch oven, and which to our uninitiated minds seemed quite as difficult to attain as the mountain tops. I cannot leave the subject of our larder without telling how it was once replenished when supplies ran low. Of course, as loyal Sierra Club members, we despised the sheep and the sheepmen, but being further instructed, we learned not to scorn the advent of a "stray sheep," which it was our bounden duty to shoot, in order to save it from the hungry bear.

One morning, after we had left a beautiful camp on Bullfrog Lake and made our way down Bubb's Creek, we walked along in single file, seeking "whom we might devour." Suddenly, the man in the lead passed the word along, "A stray." He turned upon us a beaming countenance, whose expression quickly turned to one of consternation. These two conditions were experienced by each of us in turn, when, on surmounting a slight rise of ground, we beheld not only the "stray," but also a man, presumably the herder. Visions of broiled chops and roast legs which had danced before our eyes vanished all too soon. But stay,—a bright thought—we would *buy* some mutton, although it could never have the wild flavor a "stray"

might have had. We proceeded to parley with the supposed herder, and as we approached him our wonder grew, for we had never seen his like before — not among herders. Suffice it to say, that he proved to be a traveler like ourselves, and willingly aided us to secure the "stray." Thus did we prey upon the beasts of the wilderness and send some poor bruin supperless to his lair.

Our creature wants supplied, we pushed slowly down a very rough trail, along this branch of Bubb's to its confluence with the main stream. We never could get away from the "ubiquitous Bubb's." Here Mr. Gould and Mr. Le Conte were obliged to fell a tree and bridge the stream. On this we crossed, they making many trips back and forth with the pack, while the burros swam gallantly over. In the early part of our trip, we had many a tug-of-war with these obstinate animals, but much experience had made them wise in their latter days.

Next morning our line of march was toward East Lake, from which we proposed to make the ascent of Mt. Brewer. It was slow work, there being no trail, each sheepman having "monumented" the way he liked best. We soon found it necessary to disregard the monuments and send a scout ahead to search out the safest way for our animals. The best part of the morning was spent in reaching camp at the head of the lake, and on the morrow we were to make the last and, as we then thought, the most difficult ascent.

The event proved a longer climb than to University Peak, but it was more quickly traveled, because of the absence of steep slopes covered with shifting sand. One had only to take heed that the hobnails did not slip on the highly polished slabs of rock. We noticed great fields of glaciated granite, which bore a soft pinkish-gray tinge, while that lacking the polish showed a colder, whiter hue. Further up began a great clambering and scrambling over huge tilted blocks of granite, and what with rolling rocks

down the steep snowfield and taking photographs, it was eleven o'clock before we reached the top. We had enjoyed the exercise of every muscle in the body for the last hour or two, and were now content to stretch out and rest. We recalled Clarence King's account of his ascent from the south side of the mountain, and of his making for that little, perilous notch on the divide. Suppose we had been the first to come up this way, how hopeless the tangle of mountains, ridges, and cañons would have appeared!

A thunderstorm now began to rage over Bubb's Creek, while to the south dazzling white clouds floated above Table Mountain. Further off, Mt. Whitney reared its proud helmet, flecked with snow, and southward the Kaweah group beckoned us on. What more could heart desire in the way of variety and grandeur?

Mr. Le Conte had told us that on his first visit to the mountain the summit was deep under snow, but on this day it showed a very different aspect, and but few patches remained between the rocks. We leaned over the cliff to watch the rocks that were hurled from the edge strike against the side and bound far out into the air, only to be gradually drawn toward the mountain mass again; then, leaping over the crevasse, they rolled swiftly over the snowfield. Then, less swiftly, less, and less so, until they turned over gracefully and lay down in a soft, white bed, as if weary with the long descent.

While scrambling about the summit, just where the snow had recently melted, Miss Estelle Miller had the good fortune to find the long buried record left by Professor Brewer in 1864. This rather romantic incident, linking us to the past, gave an added charm to our visit to Mt. Brewer, and really made this day the culmination of all that had gone before. We could now conjure up Professors Brewer and Gardner taking leave of Clarence King, and from this very summit, overlooking his route to Mt. Tyndall. We won-

dered whether even *they* had had storm, sunshine, and dazzling cloud to enhance the wild beauty of the scene.

So much does my imagination love to dwell upon this hour that I cannot choose but let our little party go down to camp and then back to civilization without the aid of my pen, while I luxuriate a little longer in the sunshine of these barren solitudes, which, nevertheless, are filled with arrested motion, ready to burst forth into life at the touch of the Master's hand. * * *

Upon our return to Berkeley, it was our great pleasure to meet Professor Brewer, who happened to be in California on the United States Forestry Commission. Mr. Le Conte showed him all the photographs taken during our trip, including the one of the precious paper which he had long ago left on the summit of Mt. Brewer.

In an exceedingly interesting reminiscence of his ascent, he related that he had never until that day met but one person who had climbed the mountain. His meeting with the exceptional one was in this wise:—

Some years ago, upon visiting Mammoth Cave, Kentucky, he wrote his name in the visitors' book, and was followed by an Austrian gentleman, who, on seeing the name, came to him and asked if he were the Brewer who had made numerous ascents in the California Sierra. Professor Brewer replying in the affirmative, the stranger wrung his hand with enthusiasm, and gave a spirited account of his own ascent of Mt. Brewer, some ten years ago. He had seen the record in the bottle, but being a passing traveler, his discovery was not known to Californians.

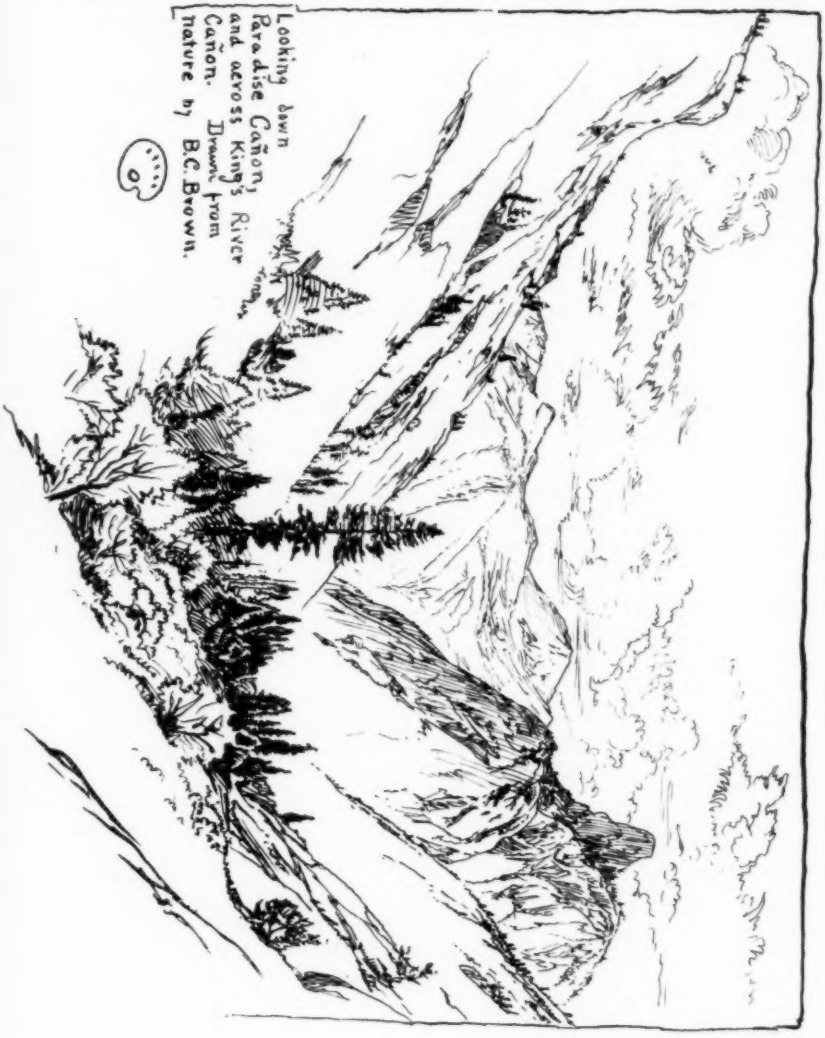
I quote Professor Brewer further in saying, that in the course of the Survey of 1864, he and his companions crossed and recrossed the Sierra fourteen times! Surely that is an experience worth looking back upon over the stretch of a lifetime. That this is Professor Brewer's verdict, can but enhance for us the value of our own brief wanderings.

WANDERINGS IN THE HIGH SIERRA, BETWEEN MT. KING AND MT. WILLIAMSON.

By Bolton Coit Brown.

PART II.

Having roughed it for three weeks, we now proposed to give ourselves the fun of making a really proper camp. We selected a beautiful spot among a grove of white oaks, twenty minutes above the ford in Paradise Valley, and proceeded to camp as you ought to camp. We made a fine table of a remarkable granite slab, with seats to match, and a shelf to hold the water-pail. Also, we built a wonderful stone stove, with a patent draught, which worked as no camp stove ever worked before. Then we made a beautiful wood-pile with the sticks all of a size and of just the right kind. We made a kind of leaf-covered roof over the bed, after which no rain fell. We arranged a place to wash dishes, and one to take baths in at the river, and put a regular cut-out trail down to them. We constructed an "elevator" with platform and rope, by which to hoist the eatables into the trees, out of reach of campers' horses and of bears. For, in this cañon, according to an old fellow with a rifle whom we met one day, "you can get a bear-fight most any time." And indeed, shortly before our advent, a party of ten from the Stanford Camp, two miles below, mostly ladies, wearing big hats with mosquito netting over them, took a stroll up here, and some three hundred yards above came face to face with a grizzly bear. He was described as "belt high," coming along the trail toward them, swinging his head from side to side. For


Looking down
Paradise Cañon,
and across King's River
Cañon. Drawn from
nature by B.C. Brown.

the story's sake, it is too bad the bear merely turned around and went back up the trail. Professor Kellogg, who was leading the procession, pronounced it a grizzly, and John Fox says he knew there was one up there somewhere. He thinks it is the last one, and speaks lightly of him as "Old Club-foot." But Fox can afford to be flippant about bears; he used to be a professional hunter of them, and long ago he, with his partner, killed two hundred and thirty-six grizzlies in the Rocky Mountains. But at last a grizzly got his partner, and Fox exchanged the Rockies for an abode in the Sierra. He has been there seventeen years now; says he likes it better than he does anything else, and proposes to "stay with it."

For some time, Lucy and I had wished to capture a desirable mountain, and name it after Stanford University; and so, when somebody left a Sierra Club cylinder down at the Stanford Camp, I brought it up and we proposed to plant it. Owing to a slight accident in camp, Lucy was feeling under the weather, and to make the trip less fatiguing, we next morning saddled Grasshopper and the mare, and rode up Bubb's Cañon, and then through South Cañon to East Lake. The trail beyond to Castilleja Lake — if one may call it a trail — is extremely steep, and I did not regret the time I had spent looking over 200 mules for the ones with the strongest hind legs. I went on before, the train followed — three of them, for Peggy had insisted on tagging along for company's sake — and Lucy was rear guard to prevent their turning back. At the timber-line, I went on alone to search out a route among the polished granite mountain-ribs to the lake. This found, the beasts came through all right, and we camped two hours before sunset.

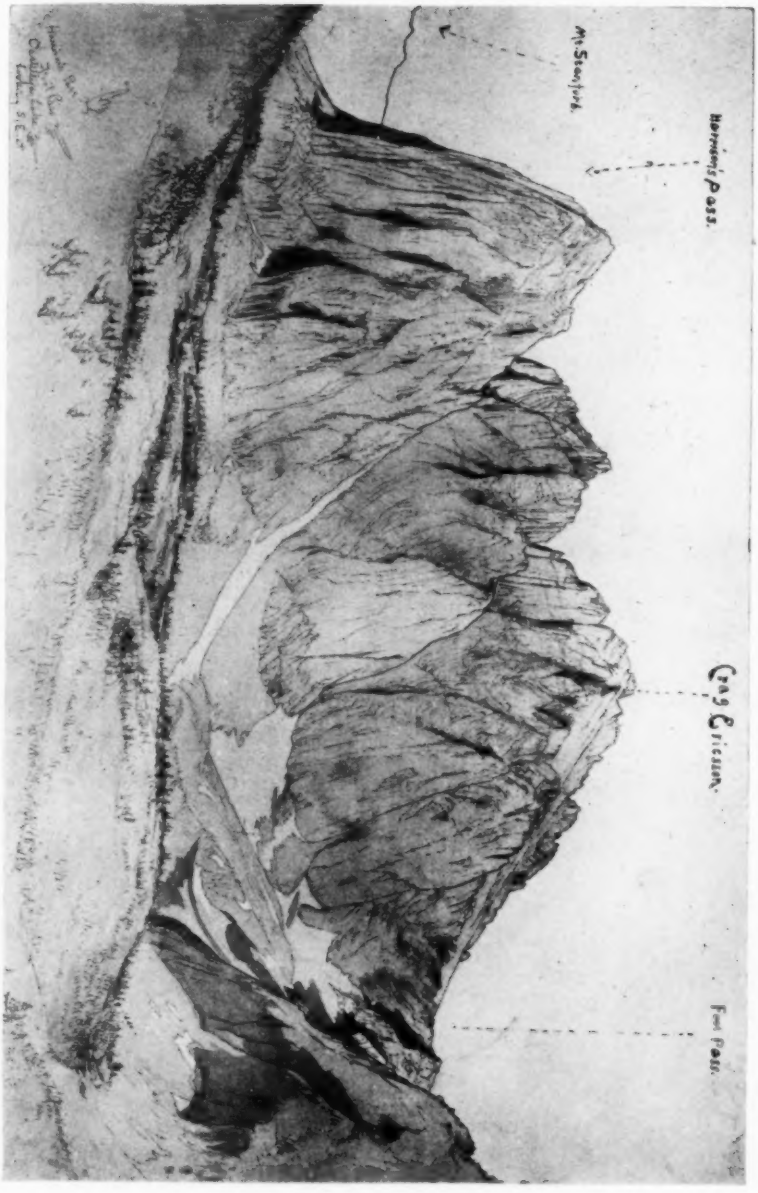
In the morning, we gathered up from the stiff frosty grass the ropes of our chilled animals, and succeeded in leading them up to the top of the face of the immense ter-

minal moraine that blocks the mouth of the gorge just south of the lake. Here, thick with good feed, was a charming little meadow, into the middle of which we dragged large rocks — there being no trees or bushes — and thereunto anchored the stock.

This gorge — the same we had traversed on the Mt. Williamson trip — we now ascended; and having clambered up the cliffs at its head, turned eastward, and began to climb the adjacent steep and craggy peak.* Working slightly to the north, we soon reached the top of the eastern wall, and looked over into an appalling gulf, from one to two thousand feet deep. Facing now southeast, we scrambled on, up among the wild pinnacles, and at noon gained the summit crag. The elevation seemed about 13,600 feet, and the view, especially to the south down the long and peculiarly straight cañon of the Kern, and to the southeast toward the Williamson-Tyndall group, and southwest to the beautiful, snowy Kaweahs, was extremely interesting and wonderfully beautiful. As it seemed that we were the first to make this ascent, we built a monument and left a record, naming it, in honor of Capt. John Ericsson, and in recognition of its extremely craggy character, *Crag Ericsson*. On the last Sierra Club map it is marked "No. 5."

The reason we did not name it Mt. Stanford was because from its top we could see that the next mountain to the east — "No. 6" on the Club map — was considerably higher, and therefore we kept this name for it. Working cautiously down the bottoms of deep and almost vertical crevices in the eastern face of Crag Ericsson, we landed on the edge of the divide and followed it eastward. Presently we came upon three stones built together, marking the

*See Plate XVI. This sketch is from the summit of Mt. Brewer, 13,886 feet high, looking southeast, and eleven miles in an air-line from Mt. Williamson.



CRAG ERICSSON.
From a drawing by Bolton Coit Brown.

head of Harrison's Pass.* According to my notion, it will hardly be a popular pass until a windlass and cable are put at its head. Beyond this we ascended a great slope of big, tumbled rocks, and at its top, just where you can first look over into the deep, snowy gulf to the northeast, we found another monument. Its single record showed it to have been made two years before by Warren Gregory and his companions.

It now became apparent that the summit of this peak is the sharp edge of a thin wall, or curtain of rock, of vast height, and precipitous upon both sides. This knife-edge runs north and south; it may be a thousand feet long, sags a hundred feet in the middle, and rises into a point at each end. These ends are very nearly the same height, and the above-mentioned monument was at the southern point. But we thought the northern one was a little higher, as it was certainly the natural termination of the promontory, and decided to put the club cylinder there, if possible. Though she had climbed steadily for nine hours, Lucy had not felt quite herself all day, and so now, when I cautioned her that the passage along the soaring knife-edge, with its 2000-foot precipices on either side, might prove trying to both nerves and muscles, she wisely decided not to attempt it. After arranging to meet at a particular lake in the amphitheatre below, which she was to reach by following down the edge of the southwestern precipice, and descending Harrison's Pass,† and I by descending the peak upon its northern side, and dropping over into the amphitheatre from the north, Lucy started back, and I slowly let myself over a smooth rock, and began to work out on the knife-edge,

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*See Plate XXVI, Vol. I, of the BULLETIN. In this photograph, to the right, just off the picture, is Crag Ericsson; to the left, just off the picture, Mt. Stanford. The dotted line goes through the cliffs at Harrison's Pass.

†See Plate XXVII, Vol. I, of the BULLETIN. The peak just to the left of the dead tree is Crag Ericsson; the next peak, to the right, is on the map as "No. 1," and Mt. Stanford is just behind it. You are looking northerly, Tyndall Creek runs diagonally and heads to the right, or east.

along the top of the wall. In twenty minutes I had accomplished it, and, across the depths beneath us, exchanged shouts with Lucy, now but a moving speck among the rocks.

The altitude is probably not far from fourteen thousand feet. A bird like an eagle, soaring grandly far beneath, saw me or heard my shouts, and circled slowly up to my level; and then higher, and higher, till lost in the depths of the dark violet sky above. Fourteen thousand feet was nothing to him.

I built a monument and left in it the Club Register, No. 14, with the name Mt. Stanford upon it. The idea of descending northward I abandoned because of the complicated masses of pinnacles, gulleys, and precipices in that quarter, which would delay me too long; and started to go back the same way I came, intending to follow down Lucy's route. But an apparently practicable chute, just where the knife-edge joins the northern peak, tempted me into trying, instead, the descent of the western face. I managed to get down about a thousand feet, and was then stopped by a sheer precipice. However, after climbing back up the chute some distance, it proved possible to work southward from gulley to gulley, and in this way I gradually descended to the cliff-base, and went flying down a steep snow-slope, and out over half a mile of talus blocks to the rock-encompassed pool where Lucy had for some time been awaiting me. An hour before sunset we reached Castilleja Lake, and next morning rode down six thousand feet to our permanent camp in Paradise Valley,—and a rough old ride it was.

But we had not been there very long when I began to hanker for another try at Mt. King, which I had tried last year, but had not succeeded in climbing. One evening I suggested to Lucy that I rise very early the next day and endeavor to get to the summit of Mt. King, and return

before night. She replied, "I wish you would; and I hope you will get to the top. I would a great deal rather that you should do it than anybody else." After that, what could I do but go?

So in the morning, about an hour after sunrise,—which was at least two hours later than it should have been,—I took a lunch and a forty-foot rope and started out. Lucy came with me to the river bank, and the old mare ferried me over. Realizing that there was not a second to waste, I at once put on full steam and hustled through tangles of bushes, and trees, and jumbles of fallen rocks at a great rate. All the raspberry bushes had been recently pawed over, and the ripe berries had been eaten, so I fully expected to see a bear, but none appeared. However, in a way, I had a bear as guide; for I followed the tracks of one up the gulley of the second tributary from the east, gaining thus the wider cañon above. The first section of this cañon is painfully long, and its floor is exceedingly rough. At its head I ascended a steep slope, two or three hundred feet high, alongside of a series of cascades. From the top of this rise, exactly centering the picture between the cañon walls, there appeared a sharp, hard peak, which I knew must be the edgewise view of Mt. King. It looked very far away, and seemed as though it would take at least the rest of the day to reach its base, let alone climbing it. However, I kept on going, and tore through the exasperating jungle of interlocked manzanita bushes and crooked poplars, "regardless." Finally I got above this, and hurrying up grassy slopes and rocky knolls, at last left the timber altogether, and ran a couple of miles to the head of a long couloir that terminates against a southern spur of Mt. King. At about half after eleven I sat a few minutes and lunched by the very last green spot. Then I went directly up the steep southern face of the peak, until, some five hundred feet below the summit, I could look over its eastern shoulder—a

look which quite gave me a qualm—it being absolutely sheer for more than a thousand feet beneath. Working across to the western edge, I looked over that precipice, and it was deeper still. These two walls approached each other, and where they met is the summit. Near the top the rocks got steeper and became more like vertical cliffs. At last I could climb no higher unaided.*

Poised on a narrow ledge, I noosed the rope and lassoed a horn of rock projecting over the edge of the smooth-faced precipice overhead. But a pull on the rope toppled the rock bodily over, nearly hitting me, who could not dodge. So I took out the noose, and having tied a big knot in the rope-end, threw it repeatedly until this caught in a crack, when I climbed the rope. I did not dally with the job either, for every second I was afraid the knot would pull through the crack. A few yards above, the operation had to be repeated, and before the summit was reached, it was repeated several times. The ugliest place of all was exactly at the last rock, only a few feet below the top. With great caution, and as much deliberation as I had used speed below, I finally looped the rope over an all-too-slight projection, along the upper edge of the side face of the topmost block, and compelled myself to put one foot in it and lift myself, and so stand, dangling in that precarious sling, until I could get my arms on the top and squirm over.

This summit is more like that of the spire of Strassburg Cathedral (550 feet) where I once stood, than any other peak I ever climbed. It is a true spire of rock, an up-tossed corner at the meeting of three great mountain

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*Upon this steep southern face of the peak, I kept running across the fresh track of some animal like a large sheep or deer. He seemed to be going up ahead of me, the track was so fresh. And I saw no returning track, though I passed quite across the territory over which the animal must come down. These tracks went well up toward this extreme summit, and into higher or wilder places than I ever saw sheep or deer tracks. But on my descent, I found the tracks going down again. Is it possible that I had scared up a bighorn, which started up the peak for safety, but being followed, stood behind some crag while I passed on up to the top, and then came out and ran down?

walls.* It is about thirteen thousand two hundred feet high, stands somewhat isolated, and commands a glorious view. It is accessible only at the place where I went up, and only with a rope at that. The top of the summit-block slopes northwest, is about fifteen feet across, and as smooth as a cobblestone. If you fall off one side, you will be killed in the vicinity; if you fall off any of the other sides, you will be pulverized in the remote nadir beneath.

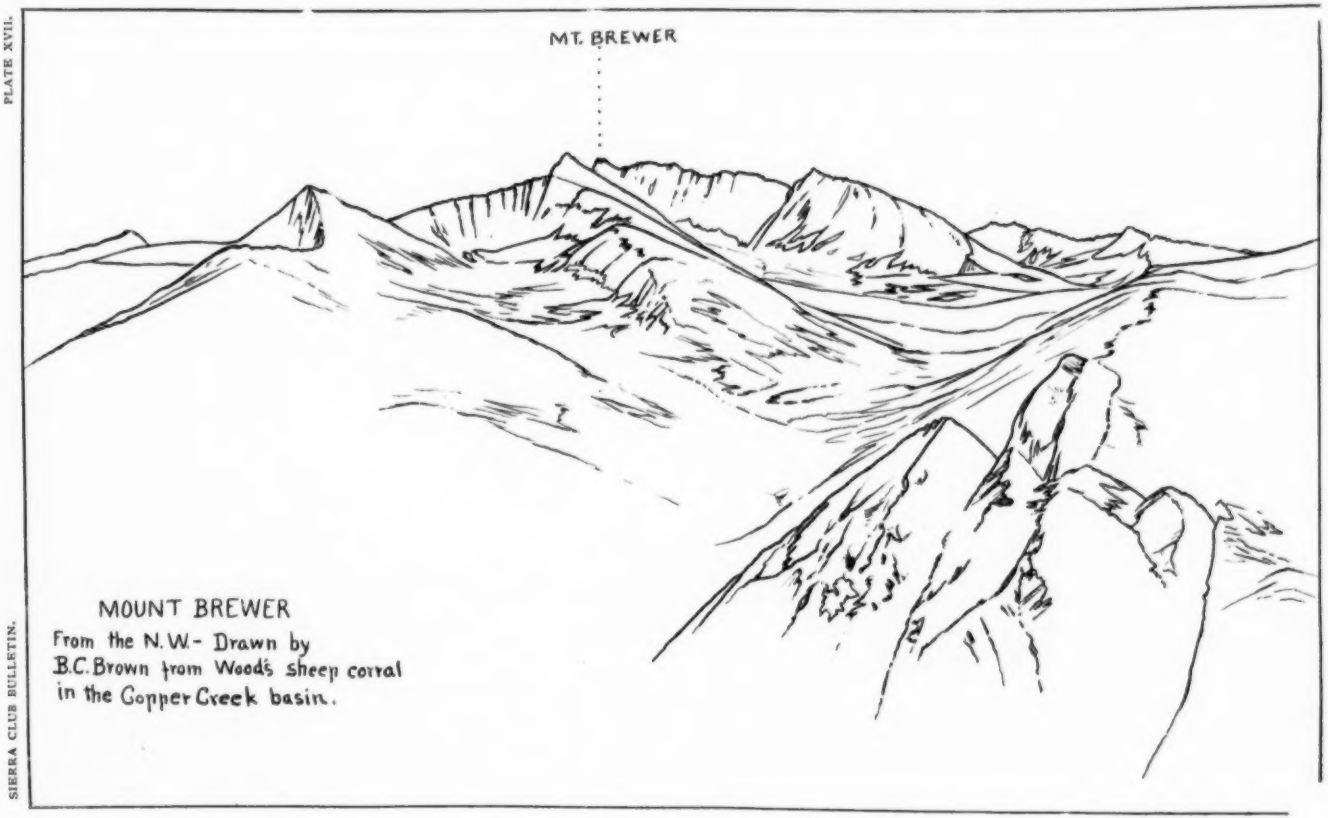
About half-past one I roped myself down again, spider-wise, from this airy pedestal; and having left a row of monuments as far as the green spot where I had lunched, scampered away down the long couloir, jumping bowlders, pools, and streams in the highest spirits. I continued to run wherever the surface did not make it absolutely impossible, hurried in the tail of the afternoon across what seemed like miles and miles of chaotic masses of big talus blocks, then, in the deepening shadows, down the throat of the narrow gorge where the stream dashes, in the twilight over massive bowlders in titanic heaps along the base of the Paradise Valley walls; then, in the dark, across the rushing river I went, foolhardily, mid-thigh deep; and then, rustling through the fallen white oak leaves, I sighted the gleam of Lucy's fire, and in a moment more,—was home.

That ended our mountaineering for the summer. We remained some days longer in the cañon; indeed, we stayed until, notwithstanding that we had had three mule loads of provisions, we were actually starved out. The streams had gone down two thirds, and where six weeks before we had washed the dishes, tall plants grew. The grass plumes held ripened seeds, and in the jungle swamps, tiger lily and columbine had given place to golden rod. As we listened

* See sketch of northern face of Mt. King in the BULLETIN, Vol. I, No. 8, page 245. The wall to the right runs west, that to the left runs northeast; and upon the other side, and making the third "great mountain wall," is another running south. The report of the old State Geological Survey says that this northern precipice of Mt. King is "several thousand" feet high—but I should not dare to guess so generously as that.

to the music and watched the green swirls of our beloved river, golden leaves—autumn's first—glided by. Then we remembered that life is not all play, and knew the time had come for us to leave this noblest of playgrounds.

And so we went, with sincere regret, and many pledges to return, down through the wild beauty of the long cañon, up the steep trail, and out over the rolling, forest-clad foothills, toward the yellow plains, sixty miles away.



MOUNT BREWER

From the N.W.- Drawn by
B.C. Brown from Wood's sheep corral
in the Copper Creek basin.

NOTES AND CORRESPONDENCE.

In addition to longer articles suitable for the body of the magazine, the editor would be glad to receive brief memoranda of all noteworthy trips or explorations, together with brief comment and suggestion on any topics of general interest to the Club.

Camping A-Wheel.

In the summer of 1894 the writer rode a cushion-tired wheel, weighing fifty pounds, and loaded with ten pounds of baggage, from San Francisco to Lake Tahoe, and back to Stockton; and for two years considered it the finest trip he had ever had. Last summer, however, it was surpassed in his estimation by a tour over the same ground, in company with Messrs. Lincoln Hutchinson and James S. Hutchinson, Jr. Our route from Sacramento lay through Folsom to Auburn, and along the line of the Central Pacific Railroad, in places beside the track, and again on the wagon road, to Truckee, and then over the toll road to Lake Tahoe. After spending four days, walking and camping among the magnificent granite mountains west of the Lake, we returned over the Placerville road to Stockton. In this case we had lighter wheels—mine weighed twenty-three pounds,—and it occurred to my friends that, as I had carried a total of sixty pounds on a cushion-tire, we ought to be able to carry forty pounds each of blankets and provisions on our improved mounts; and so we decided to try a camping trip. In spite of two "blow-outs," a broken crank, a broken saddleclamp, and the fact that neither of the Messrs. Hutchinson were in good practice at the start (though they were at the finish), the trip was voted a great success. In the hope that our experience may prove useful to some readers of the Sierra Club Bulletin to whom the expense of getting to the mountains seems heavy, we venture to make a few suggestions applicable to bicycle camping trips in general. The road maps now published will usually suffice for information as to the country through which it is desired to pass.

Carrying the Outfit.—The general principle to be observed is, Keep the weight off those parts of the wheel that are moved in steering. The following plan is recommended: Buy a leather "touring-bag," made to fit into the frame, which will cost about $3.50. This is to carry the cooking utensils and the provisions, and it is better not to attempt to carry a much greater quantity of provisions than it will hold. The blankets, clothing, and any small quantity of provisions that will not go in the "trunk," as

we called it, should be made into a roll about sixteen inches long and of as small diameter as possible, and fastened behind the saddle. Various forms of carrier for the pack behind the saddle may be devised, but a couple of pieces of clothesline, four feet long, with a loop in one end, will answer admirably. The pack may be securely fastened to the wheel as follows: Make the blankets into a tight roll, sixteen inches long, pass a strap around each end, and buckle firmly. Balance this on the rear wheel, buckles on top. Standing behind the wheel, hold the looped end of one of the pieces of clothesline, and pass the other end forward, under the roll, *outside* of the rear forks, and then upward, *between* them. Take a turn around the horizontal part of the saddlepost, forward of the saddleclamp, bring the end of the rope over the bundle and pass it through the loop. Do the same with the other rope on the other side of the rear forks. Then, holding the roll up against the saddle with one hand, pull upward on the free end, first of one rope and then of the other, and when as tight as possible, fasten with any suitable knot. This operation should be managed in such a way that the loops and knots are low down on the back of the roll, not under it. Then roll up the spare clothes and anything that cannot be put in the trunk, and use the ends of the straps and of the ropes to fasten this roll on behind the blankets. By passing the ropes around the forks as described, they are kept sufficiently far apart to prevent the bundle from swinging sidewise too much; by taking a turn of each rope around the saddlepost, instead of suspending the weight from the hind part of the saddle itself, the danger of breaking the saddleclamp is avoided; and finally, by having the knots and buckles come in the positions mentioned, before putting on the second roll, the entire pack is kept from sagging on the rear wheel. When a pack is put on behind the saddle, the step cannot be used for mounting, and it is advisable before starting on a trip to learn thoroughly the pedal mount, for the reason just given, and also to enable one to mount on a hill. One should practice until able, in mounting, to start the wheel by the weight on the pedal, without any forward push, as the pack is apt to be too much for one less expert. And it should be practiced on both sides of the wheel, especially if the party expects to do any riding beside a railroad.

What to Take—Blankets.—We each carried a sleeping bag about three feet wide, made of one double blanket and an outer canvas cover, and there were two rubber blankets in the outfit. We intended to put these latter on the ground at night; but it was so cold at night in these mountains, that we found it necessary to use them for a tent. By locating the bed beside a log three or four feet in diameter, rolling a twelve-inch log to the foot, stretch-

ing a small rope from one to the other, and fastening to the rope the rubber blankets, and then piling brush along one side, we constructed a fairly serviceable tent, which kept the temperature above the freezing point. But we concluded that a regular tent made of very light canvas, and arranged with guys so that it could be set up with only such poles as can be cut with a small hatchet each night, would not only be more satisfactory, but would also save a great deal of time night and morning, when time is most valuable. Such a tent should weigh no more than the two rubber blankets, and would answer more purposes. On cold nights it was found necessary to supplement the regular bicycle costume with a suit of heavy underclothes. Possibly a sweater would be found more serviceable.

Utensils.—The pails we had, instead of being circular in section, were rectangular, and for convenience in carrying were made so as to "nest." This form is recommended for another reason: They will stand closer together over the fire. For a party of three, there should be five pails, the largest holding from a gallon to a gallon and a half. Two of them should be arranged so that they can be used as a water bath for cooking mush, etc., which device we think will save much time and annoyance. We carried our pails in a wooden frame, strapped in front of the handle of one bicycle, and we put the soap and towels inside the smallest one. This arrangement rattled so much, that the hitherto silent steed was dubbed by one of our party, the "ice-wagon." Of frying pans we had two, which had been purchased some years before with two second-hand army haversacks. These pans were oval, and each had an oval tin cover, hollow like the pan, and fitting into a groove around the edge of the latter, so as to include between pan and cover a space an inch or more deep. This combination made an excellent arrangement for cooking bread, on the principle of a Dutch oven. The handles were hinged so as to fold over the cover of the frying pan and clamp, thus holding the arrangement together in transit. We would recommend a single frying pan of this form, but twice the size of ours. Each person should carry his own tin cup in such a way as to be readily accessible at all times. A good way is to hang it on the forward buckle of the trunk flap. A small hatchet is indispensable. We carried ours in one of the trunks, with a grooved piece of wood tied over the edge. Probably a "stove," similar to that described in the article on Mountain Trips, in the last BULLETIN,* would be worth taking.

* Vol. I. p. 32. Mr. Longley calls attention to the fact, that through a slip of the pen, the iron was made needlessly thick and heavy. One-eighth inch he thinks is heavy enough.

Provisions.—We took such as are taken on any camping trip. We made no attempt to carry a supply to last the entire two weeks, but found that what we could take was, with the bread and milk purchased daily, sufficient for about one week. We bought a dozen eggs at Cisco, which we carried safely for some miles, and at Truckee we replenished almost our entire stock at very reasonable prices. Several days later we bought some potatoes. Rice, flour, meal, etc., should be carried in small cloth bags, properly labeled with indelible ink. If tied so as to leave a little space inside, these will readily adapt themselves to the shape of the trunk, and pack snugly. It should be said, however, that on account of rain, lack of time, etc., we thought best to get some of our meals at hotels. Perhaps the following data may be of interest:

Meals in camp	101	Meals at hotels and restaurants	31
Total cost	$10.60	Total cost	$8.35
Cost per meal per person	10½ cents	Cost per meal per person	27 cents

The best lunch for such a trip is a pint of milk and a large chunk of bread. It satisfies both hunger and thirst, it costs very little in the mountains, and at the same time reduces the quantity of provisions to be carried, and it permits hard work almost immediately afterward. We bought our milk wherever convenient in the morning, and carried it in our canteen, slung over the blanket roll or over the handle. It is advisable when milk is used for lunch not to drink too much of it at other times. And it may also be said, that it is necessary to be sparing in drinking water during the first two or three days, in spite of the terrific thirst, which will pass away in time.

The most essential points have now been covered, but a few minor suggestions may be worth making.

The trunk is apt to bulge out, so as to come in contact with the ends of the cranks and the sprocket, which will soon wear through the leather. To prevent this, pass a piece of buckskin or string through small holes made at the points on which the wear comes, draw the sides of the trunk together and knot the ends of the cord.

All the wheels ought to be provided with brakes, not for use in coasting, which wears out the tire, but to guard against accidents. It gives one confidence, and permits greater speed in riding on roads with sharp turns; it enables the rider, by quickly checking his speed, to avoid many collisions with large stones or other objects in the road, which might severely strain or damage the bicycle, and it is a safeguard in descending a steep hill.

The rear tire has to support nearly all the weight of the rider and pack, and there is no economy in trying to get along with a

badly worn one. Much time and annoyance would probably be saved by using comparatively new tires on both wheels. If double-tube tire is used, and the outer case is badly worn, or much pierced from old punctures, exceedingly fine thorns or bristles are apt to reach the inner tube, and it is almost impossible to locate the resulting punctures, especially as there is often no still water for miles in the mountains.

With a small quantity of iron and copper wire, and a light pair of pincers, a few wire nails, plenty of strong string, a few buck-skin thongs, extra straps, a couple of small machine bolts, a piece of tin, ingenuity, and occasionally the assistance of a country blacksmith, it is astonishing what apparently irreparable accidents can be overcome. But in case of a broken crank, don't try to mend it—telegraph for another, and wait till it comes. We speak from experience.

Finally, pay no attention whatever to statements about roads. Sometimes they are reliable, but here are two examples: On the writer's first trip, mentioned above, he was told in Sacramento by two people, who were vouched for as having been over the road which follows the Central Pacific Railroad, that he could n't possibly get to Lake Tahoe on it; that it was full of bowlders, and that a buggy which had come over it a couple of weeks earlier during the great railroad strike had been literally smashed to bits. As a matter of fact the road was very good, except in places where the dust was deep, and there were no bowlders in it. Again, our party last summer were informed by a couple of sheep herders, who had just come over the road between Cisco and Summit, that we had better ride on the railroad, as on the road we should have to carry our wheels—we could not possibly push them. The following day we covered the level portions of the road mentioned at the rate of twelve miles per hour, finding it the most enjoyable portion of the ride. One of our party rode over it with but one pedal. And yet, to the best of our knowledge and belief, these people were not practical jokers, but actually supposed they were giving useful advice.

Our principal reason for undertaking a camping trip on bicycles was to save expense. Upon our return we figured up that, exclusive of some repairs, but including expenses on the boat to Sacramento and railroad fare from Stockton to San Francisco, we had spent $12.85 each during the two weeks. But we found that this way of traveling is not only economical, but is also ideal for the mountain lover. One is absolutely independent of everything except wood, water, and something which comes in the general category of things called roads; and almost any kind of road will do. My friends, who had just returned from King's River Cañon,

spoke frequently of the great relief of not needing to regard the question of pasture. And when one goes for the pleasure of the trip, and is not limited as to expense, many improvements might be adopted. For instance, we think very likely an eider-down sleeping bag would be lighter and warmer than our blankets, and many conveniences for saving time in camp might be devised. But, even with such a rough-and-ready outfit as our party had, we all unite in saying that for a vacation there is nothing like camping on wheels.

ROY R. DEMPSTER.

SAN FRANCISCO, March 27, 1897.

REPORT OF A TRIP FROM YOSEMITE TO KING'S RIVER, VIA THE BASIN OF THE MERCED.

On the 3d of July, Mr. Theodore S. Solomons, '98, Mr. Allan L. Chickering, U. C., '98, and myself, left Yosemite by the Little Yosemite Trail, with four pack horses. In taking a cut-off from the head of the Nevada Fall to Lieutenant McClure's trail from the southern base of Starr King, eastward to the Merced River, we encountered some difficulty on the slopes southwest of the Little Yosemite, but for the benefit of those who in future may try this route, we monumented the way to smooth country. We passed to the north of Mt. Starr King, just above the steeper slope of the cañon wall. Here storms delayed us for two days; then we made good time. We struck McClure's trail about three miles east of Starr King, and followed it to the river. It is nowhere a *trail*, being simply a blazed route, portions of which were formerly used by sheepmen. The blazing was done by the cavalry in 1895. Very smooth traveling is found until the slopes of Mt. Clark are reached, when the route leads over rocky ground, intersected by spurs descending from the mountain. The last pitch toward the river is down a steep, brush-grown slope, where the route is very obscure and the way dangerous to inexperienced animals. Three or four hours' work with an axe and crowbar, however, would be sufficient to make a fairly good trail of it. This was the only really bad place we found along the whole route to the Little Jackass Meadows, with the exception of the unblazed portion now to be noticed. From the main river to the point on the McClure Fork where we intersected the trail described by Lieutenant McClure as leading from Jackass Meadows to Tuolumne Meadows, we failed to find any clear trail; but we experienced no very great difficulty in reaching that point by a route of our own, along which, however, there were traces of the passage of the cavalry, notably, down the river, from the ford nearly to the McClure Fork.

The Merced Cañon country, I should note in passing, we found surpassingly fine; and in my judgment, no more important work could be attempted by the Club or the authorities of the Park than the rendering of the Upper Cañon of the Merced accessible to Yosemite tourists. The depression through which runs the main stream and its many branches is irregularly formed, and hence presents scenery of varied and most picturesque qualities. Bare walls, bosses, and promontories strongly suggest the great valley beyond, in the hue of the granite and its peculiarly bedded structure. In the wide cañon bottom is an uninterrupted succession of groves, meadows, and lakes, and on the ridges above, and in the basins of the smaller streams, the forest growth is the most healthy I have seen in analogous portions of the range. I noticed a remarkable scarcity of dead trees, especially of the "Tamaracks" that grow among the wet meadow flats. Towering above the forest ridge, finally, the main crest on the east and the strikingly fine Merced Group on the west nearly enclose the Merced Basin, and from all points furnish splendid backgrounds to the views. Between Lake Merced and Lake Washburn there should be no great difficulty in finding a good route; and above the latter the cañon is wide and not hard to traverse. A few miles above, the Lyell Fork enters the main cañon—now a fine river valley—over one great sweep of bare granite, a couple of miles in length, down the slanting face of which the stream makes a continuous cascade. All the tributaries, Gray Peak, Red Peak, and Black Peak Forks especially, show cascades only of less dimensions and splendid appearance than that of the Lyell Fork. Finer country to camp in does not exist in the Sierra—when once the region is pierced by a good trail from the west. The lakes have been stocked by the Fish Commission, and the whole length of the river for some fifteen miles should soon be populous with trout.

From Mt. McClure Fork the blazed route out of the Merced Basin is a splendid one, and the final climb to the pass and the descent to Granite Creek on the San Joaquin side so short and easy as not to be worth mentioning. The same divide is crossed that was considered impassable by the old California Geological Survey. There is apparently just this little nook of a pass that had been spied and quickly utilized.

With the exception of the obscure section after crossing the main river north of Mt. Clark, previously alluded to, the route marked on the Club map, and drawn in more detail on Lieutenant McClure's map presented to the Club, is perfectly plain throughout. The branching of the trail below Sadlier Lake is indicated by an immense monument and two T's. In approaching Little Jackass Meadows by the easternmost of the two branches, no direct connection is made with the Mammoth trail, but the lat-

ter is so well worn that it cannot be missed. You have simply to continue south. The cut-off eastward to the latter trail from a point a few miles below Sadlier Lake we did not identify with any certainty.

Following the Mammoth trail from Little Jackass Meadows to Granite Creek, we then made our way without difficulty down the eastern side of that creek, and intersected, some miles below, the Shut Eye trail, as it is called, leading to the Miller & Lux bridge on the main San Joaquin. The bridge across Granite Creek on the trail, having been washed away last spring, the sheep herders now use a ford considerably higher up, and take a cut-off trail east, northeast, and then south, intersecting their main trail about halfway down the hill to the river. After crossing the San Joaquin, we kept south, parallel to the South Fork, along the Lower trail (which we found difficult to follow, perhaps owing to recent heavy rains), to Mono Creek, which we pretty thoroughly explored to its highest sources. Thence we traveled by trail to Lost Valley and to the north branch of the South Fork, from which an expedition was made to Mt. Goddard, the peak being climbed in a storm which effectually shut off the view. Two of our horses having cast their shoes, it became necessary to make a visit to Ockenden's, where is to be found the nearest blacksmith shop. There being time for no further exploration of the crest, Mr. Solomons left the party, and Mr. Chickering and myself then took the Dinkey trail to Tehipite, the Tu-ne-mah trail to the Upper Middle Fork Cañon, and the Granite Basin trail to King's River Cañon. From there we quitted the mountains, via Millwood, which we reached August 2d. The joint collection of negatives which was secured during the trip consists of about 100 of the size 6.2 x 8.2, and some fifty of 3.2 x 3.2. The topographical and other data gathered will be put into the form of a supplemental report by Mr. Solomons, and added to his report on this region, filed with the Club last April.

The season was unusually stormy. We had rain, hail, or snow some sixteen days out of twenty-five, and, contrary to precedent it rained during the night several times.

WALTER H. STARR.

NOTE TO PROFESSOR STILLMAN'S ARTICLE ON A TRIP FROM KING'S RIVER CAÑON TO TEHIPITE VALLEY.

While the shortness of the distance between the two cañons makes the route described by Professor Stillman in the last issue of the BULLETIN the most desirable one, it will be noticed from his account of it that, in its present condition — which is not likely soon to be improved — the trail from the divide

to the Middle Fork is obscure, and the way treacherous and quite impracticable for animals. It may be well, therefore, to remind those who may desire to visit Tehipite from the Grand Cañon, or *vice versa*, that there is another, and a very plain and safe trail, by which the trip can be made. It is true, as Professor Stillman suggests, that the time required by this other route is considerably greater, but, as offsetting this, the intending traveler may promise himself some expansive views of the wildest part of the High Sierra, and also some cañon scenery quite different from, yet fully as inspiring as, that of either Tehipite or the Grand Cañon.

The route referred to makes use, first, of the Granite Basin trail to the Upper Middle Fork Cañon; next, of the Tu-ne-mah trail to Collins' Meadow (Crown Valley), and lastly, of the excellent trail thence to the floor of Tehipite. The journey may be traced on the new map; and with no other guide than that the tolerably experienced Club member could doubtless make the trip without mishap; but for the inexperienced, a few verbal directions may not be unhelpful. For the suggestion of the cut-off near Collins' Meadow and the route to the summit of Tehipite Dome, I am indebted to Mr. W. A. Starr and Mr. A. L. Chickering. The trails and the district they traverse will be found described in some detail, and illustrated by photographs, in the report on the region north of the main King's River, filed with the Club by the writer, last April.

If the start is made from the South Fork, follow the trail leading up the cañon on the north side of the river. When within a few hundred yards of Copper Creek, which is the large tributary entering from the north just east of the escarpment of the North Dome, a branch trail will be encountered, leading obliquely to the left. This is the Copper Creek, or Granite Basin, trail. It ascends the main stream of Copper Creek for about two miles, the ascent not being very steep, and then follows the long, sloping shoulder between the main basin of the creek — which now sweeps toward the northwest — and a western branch bearing down from Mt. Hutchings. Arrived at the summit of the wall overlooking Granite Basin, if the trail has been obscure, search along the divide for the monuments, and until the bottom of the basin is reached, be careful not to advance without their guidance. Before leaving the divide, glance over the basin, fixing in mind its topography, and especially the position of the lowest point of the northern rim of the basin. This is the pass. It will lie in the direction north by ten or twenty degrees west. When the trail becomes obscure, or is lost at the bottom of the basin among the meadows, make straight for the pass, keeping, however, toward the right, or east side, of the basin. As the ascent is

made toward the pass, you cannot fail to fall into the trail, nor to keep it thereafter until it reaches the Middle Fork. Just before getting to Dougherty Meadow, though, when skirting the southern margin of a pond, avoid a well monumented and blazed trail which leads to the right, southeastwardly up the hill. Mr. Starr also reports that the terminal point of the trail in the Middle Fork Cañon is about midway between Horseshoe Creek and Dougherty Creek, instead of being nearer the former, as it was drawn on the map, and also that the distance between the two is not so great.

The bridge across the Middle Fork was swept away in 1895, and has probably not been replaced, but at any time after high water the stream may be forded at many points above its site. Trails lead up the river on both sides. Cross to the west, and follow the path on that side along a sandy flat, strewn with bowlders, to the angle formed by the intersection of the main cañon with that of Goddard Creek. Here, winding in zigzag curves, now on one face of the angle, now on the other, the Tu-ne-mah trail makes its steep ascent to the very summit of the mountain, 4900 feet above, in something like five miles of trail. In making the climb with laden animals, be sure not to start after the noon hour, as, on reaching the summit, an equally steep descent of about 2000 feet immediately follows. The trail is much worn by sheep and pack animals, but in some of the steepest and rockiest places, sheep have made many false trails, which are apt to cause annoyance, though they cannot mislead for any distance. It is well, therefore, to constantly reconnoitre ahead. From the summit, the trail is plain to Alpine Meadow, to Blue Cañon, and to Collins' Meadow, where one of the oldest trails in the mountains leads out to the Pine Ridge Settlements. Near the corner of Collins' Corral the Tehipite trail parts from the Tu-ne-mah trail, and runs south by west to Tehipite, keeping well above Crown Creek. It is not necessary, however, to go to Collins'. After passing Kettle Rock (which lies to the north, and not to the south of the trail, as the map shows), select a good route, and make directly south across Crown Creek and up the other side to the Tehipite trail. From the Kettle Ridge divide (just before reaching which from the north, there is a little meadow in which you may camp) the Dome may be reached on horseback. Ride southeastwardly directly along the watershed of this ridge, taking care not to get off on little spurs bearing to the right, until a little depression, or saddle, alone intervenes between your ridge and the Dome Ridge, which has a north and south trend. Cross to the latter ridge, and you may ride almost to within a stone's throw of the true summit, which is most safely reached by the spine or crest of the ridge, rather than by the ledges on either side.

Average traveling time would be:—

From King's River Cañon to Granite Basin, one afternoon; thence to Upper Middle Fork Cañon, one short day; thence to meadows north of Blue Cañon, one day; thence to Tehipite, one day. From Tehipite to the end of the stage line at Ockenden's, or Pine Ridge, two and one half days.

THEODORE L. SOLOMONS.

ROUTE FROM THE GRAND CAÑON TO TEHIPITE, DOWN THE MIDDLE FORK.

There is yet another way of reaching Tehipite, which may in time be found a good alternative, either for the direct route over the ridge described by Professor Stillman in our last number, or for the longer detour to the north described by Mr. Solomons in his memorandum just above. This third route, like the last, leaves the Grand Cañon by the Copper Creek trail, and is identical with it until the Middle Fork is reached, between Dougherty and Horseshoe Creeks. From this point, instead of crossing the river and climbing the mountain ridge on the north, and descending again to reach the valley, the new route follows the Middle Fork directly down. During the summer of 1896, Mr. W. L. Richardson and Mr. T. P. Lukens, of Pasadena, made a short reconnoissance of the eastern end of this route, and afterwards arranged to have some work done upon the trail, of which Mr. Richardson sends us the following account:—

"From the Middle Fork crossing a trail is marked on the map down to Tehipite, and along it is a line of interrogation points, the meaning of which we afterwards learned. Mr. Lukens and myself made the attempt to get down with three heavy packs and two riding animals. The result of about five hours of hard labor found us only two and one half miles from camp. As the prospects for better traveling became less and less the farther we advanced, and as our time was limited, we decided to return. Mr. Lukens employed two prospectors whom we met in the cañon to build a trail down to Tehipite. I named it the Lukens trail, and made two small signs to be placed at each end. Work was commenced the morning we left. I understand the men placed the first sign all right; but reaching a somewhat open meadow they placed the other sign there, thinking they had reached Tehipite. They afterwards discovered their mistake, but did not have time to go back for the sign. Neither did they do as much work on the lower portion of the trail as they would have done, had they had the time.

"The trail is clean and well made for some distance below

Broken Dutch Oven. The rest of it, down to Tehipite, has been cleared of brush, blazed, and monumented. This portion of it is quite rough, and more work should be done on it to put it in good order. I would suggest that if persons going there this summer would lend a hand, and spend each but a few hours in work upon the trail, we soon might have a broad and easy way of reaching Tehipite. And in general, if each member of the Sierra Club who spends a portion of his time in the Sierra, summer by summer, would do a little work on some of the bad places on one of the trails he travels over, in the course of a few years much would be accomplished toward putting our principal mountain trails in good order.

"Some systematic blazing and monumenting in places where trails are not well defined would save a great deal of delay. If a small tin sign could be tacked up at the intersections of the main trails, it would be of great aid to those traveling without a guide. Such signs would cost but a trifle and last a long time. Perhaps this is one of the most important improvements which might be made in the Sierra. To many it is a difficult thing to find their way about the mountains, even with a map and compass, whereas, if at each intersecting trail or branch a sign were placed, it would dispel that feeling of uncertainty, and one would be confident of reaching the end of his journey without having to retrace his steps on some wrong trail.

"Let us begin work at once. There are many campers and prospectors who will aid us when they see we are in earnest. I should be pleased to hear from others on this subject."

W. L. RICHARDSON.

NOTES ON A TRIP TO KING'S RIVER CAÑON.

Our outfit consisted of the usual camp provisions and paraphernalia, the total weight of which, for our party of five persons for a three weeks' trip, was about six hundred pounds.

Our guides were Walter Pettit, an old mountaineer and trapper, and John Botkin, a younger man, who acted as assistant to Pettit. Both men are thoroughly acquainted with the country immediately surrounding the cañon of the South Fork. They are painstaking and careful, and our party all agreed that no guides could be found that would give greater satisfaction for such a trip as ours.

Our animals, of which we had eight (five pack- and three saddle-animals), were furnished by Pettit. They were all in good condition, and thoroughly accustomed to mountain trails. For these eight animals and the services of Pettit and Botkin as guides, packers, and cooks, we were asked only the very moderate sum of $4.25

per day. We, of course, furnished provisions for both Pettit and Botkin, but they provided the horse-feed, when it was necessary to purchase any.

The actual traveling time, from point to point, was as follows:—

Millwood to Converse Basin	2¾ hours
Converse Basin to Bearskin Meadow	2½ "
Bearskin Meadow to Burton Meadow	2¾ "
Burton Meadow to Horse Corral Meadows	3½ "
Horse Corral Meadows to Summit Meadow	2½ "
Summit Meadow to Fox's Cabin	2 "
Fox's Cabin to Zumwalt's	2½ "
Zumwalt's to Mouth of Bubb's Creek	1¼ "

Returning:—

Bubb's Creek to Fox's Cabin	3½ hours
Fox's Cabin to Summit Meadow	2¾ "
Summit Meadow to Horse Corral Meadows	1 "
Horse Corral Meadows to Burton Meadow	2 "
Burton Meadow to Bearskin Meadow	2 "
Bearskin Meadow to Big Trees in General Grant Park	2¼ "
Big Trees to Millwood	¾ "

I give these distances in hours, instead of miles, for two reasons. In the first place, the character of the trails and the country passed over varies so greatly that a distance given in miles conveys a very inadequate idea of the amount of work to be done in going from point to point. In the second place, we could find no two persons who were agreed as to the actual distances.

Two members of our party, with one pack-animal, made a trip to Kearsarge Pass, via Lake Charlotte, and returned via Bubb's Cañon. The traveling times were:—

Bubb's Creek Junction to Lake Charlotte	6¼ hours
Lake Charlotte to Summit of Kearsarge Pass	2¼ "
Kearsarge Pass to Bubb's Creek Junction	5¼ "

LINCOLN HUTCHINSON.

FOOD SUPPLY FOR MOUNTAIN TRIPS.

The interest shown in the timely article by Mr. Howard Longley in the January BULLETIN, on "Mountain Trips; What to Take, and How to Take It," leads to the hope that further contributions of a similarly practical nature will follow. It is of the utmost importance that the Club should encourage its members to take to the field by supplying them with all the information possible; for it is often for lack of just such advice as that given by Mr. Longley that many a half-formed plan of campaign in the Sierra fails of realization.

The food question, especially, is a matter of the first importance. Mr. Longley's list seemed to me to be deficient in meats, and somewhat luxurious as to certain articles that are either bulky

and difficult to handle or that contain a great deal of water. I am assured by the author, however, and am given his permission to emphasize the fact here, that the food supply he suggested was intended for a party that expected to rely on hunting and fishing for part of their animal food, and, in general, that his advice was addressed more particularly to those who proposed short trips to frequented points. Mr. Longley agrees with me, that for those contemplating lengthy or rough trips, or when, for other reasons, weight and bulk must be economized, some modification of his list becomes necessary.

The results of my own experience, and also of that of others with whom I have discussed the subject, were embodied in some suggestions as to outfit which I added to a typewritten report on the region south of Yosemite, filed with the Club last year. The chief points are these: The most important matter for any kind of trip is to take sufficient protein foods, to insure replacement of muscular tissue. The harder the physical work the more protein is needed. An average amount would probably be a little more than is commonly consumed when at home. This is the secret of avoiding emaciation in active or prolonged mountaineering. The other point which applies to mountaineering parties in general is, to secure foods of such palatability as to insure the highest percentage of digestion. To this end the individual tastes of the different members must be consulted, and a kind of average determined. Bulk must never be sacrificed to concentration, or the percentage of assimilation will be lowered.

The details of the ration are best considered by dividing mountaineering parties into two general classes: that to which Mr. Longley particularly addressed himself, or those parties that attempt only a sojourn of moderate length in frequented districts, and intend to travel easy trails; and secondly, that class of parties that set out to traverse the rougher and less frequented districts.

The former class should take as great a variety as possible. They should not hesitate at tomatoes, corn, canned fruits, and potatoes, in spite of the large proportion of water which these contain, if they have animal power enough to transport them, nor at soda crackers and eggs, as long as they are willing to take the time to pack these carefully and can afford the space they occupy. To such—whom I shall envy—I would suggest, also, canned tongue, chicken, lobster, roast beef, and shrimps in tomatoes, as being nearly as palatable as the fresh articles. Chocolate and nuts (unshelled) are fine foods.

For parties of the second class, the several conditions to be secured are usually about as follows: Food that may be prepared easily, and much of it quickly, and in high altitudes; that contains

a proper proportion of protein, that is not too difficult to digest, and finally, that may be obtained in as compact and dry a form as possible.

These conditions are admirably met by the appended schedule, which is arranged according to the leading nutritive, and also the hygienic, characteristics of the several foods. The first three heads form the nutritive classification, and the fourth, the hygienic. To illustrate: Dried fruits, being more useful in the purely hygienic function of furnishing bulk, acting as an irritant, etc., than in the nutritive function of supplying carbo-hydrate matter, have been put in the fourth column, but the figure *2* placed after them indicates also their chief nutritive characteristic. Conversely, butter is most useful as a fat food, but the figure *4* placed after it shows that it has also a hygienic value, in that it assists the digestion of other foods by rendering them more palatable. Finally, certain foods, like beans and bacon, have been related by figures to other columns, to show that they partake also, but in a less important degree, of other nutritive elements.

As to the quantity of each food, the relative amounts here given were found satisfactory by two persons during one season, and by three during another, but only the general proportions of the several nutritive classes are insisted on as important. For instance, while it would be perfectly safe to eat less mush and more bread, or more butter and less bread, it would be poor policy to take too little of the proteids or too much of the stimulative foods. The total amount given is intended to provision three men for a period of four weeks. Those items in parentheses were not always taken by our parties, but are given for the purpose of enlarging the list of convenient foods and of furnishing substitutes, if desired, for some of the others.

I have had some success in carrying butter and keeping it fresh. I buy the best fresh creamery, in square form, wrap an extra butter cloth about it, lay it and fold it in a second cloth liberally sprinkled with rock salt, and finally wrap it well in several thicknesses of sack cloth and tie it lightly. The package is never allowed to become dry, and at night it usually decorates the limb of a tree. Thus treated, the butter should be eatable for at least six weeks.

The surplus lard melted in the cooking of bacon is used for frying; hence, but little of the fats have been suggested.

One thing more—though this is hardly a matter of food. If you would be happy in your bread-making, discard your heavy Dutch oven and beg, borrow, or steal a reflecting oven. They are light, fold up, and fit into the pack bag; your bread, biscuit, pie, pudding, or cake bakes while you are cooking the rest of the meal, and by the same fire, and the contents of the baking

pan are alway in sight, so that none but a blind cook could burn them.

1	2	3	4
PROTEIDS.	CARBOHYDRATES.	FATS.	STIMULATIVES AND DIGESTIVE AIDS.
lbs.	*lbs.*	*lbs.*	*lbs.*
12 Corned beef *3*	3 Rice	2 {Lard, Cottolene, or Beef fat	1 Salt
12 Roast beef *3*	20 Mush cereals	6 Bacon *1*	¼ Pepper
20 Ham *3*	45 Flour	8 Butter *4*	(Ketchup)
4 Tongue *3*	(Cornstarch)	28 Condensed	½ Mustard
(Chicken)	6 Jam or jelly	Milk *1, 2, 4*	(Vinegar)
(Lobster)	4 Chocolate, *3, 4*	5 Shelled	(Horseradish)
6 Cheese *3*	40 Sugar *4*	almonds *1*	1+ Baking powder
4 Sardines *3*	(Maple sugar)	(Walnuts)	(Citric acid)
6 Salmon *3*	(Syrup)		(Lemon extract)
(Peptonoids)	1 Honey		2 Extract of beef
(Dried beef)			3 Coffee
(Smoked herring)			⅓ Tea
6 Beans *2*			(Cocoa)
			2 Whiskey
			(Onions)
			6 Dried fruits *2*
			(Raisins)
			(Dates, figs)

Total, 252 pounds, or 3 pounds per day per man.

THEODORE S. SOLOMONS.

A MAP OF BUBB'S CREEK BASIN.

The small map of Bubb's Creek Basin, which appears in this number of the BULLETIN, will, I hope, be of assistance to those who desire to visit that rugged, though picturesque, portion of the King's River Sierra. The more important trails and routes are shown along the main stream, up the south fork, and about Mt. Gardner and the Kearsarge Pass. The source of the main stream appears to be in a wide basin between the Main Crest on the east and the spurs of the Kings-Kern divide on the south and west. Though no reliable information concerning the trails in this basin was obtained, there can be little doubt, from the appearance of the country, that it is readily accessible to pack-animals.

The positions of peaks were determined by reference to Mt. Whitney and Mt. Williamson, whose geographical coördinates are given in Captain Wheeler's "Geographical Surveys West of the One Hundredth Meridian." These give a base line about five miles long, and are easily distinguishable from any other high points. From this base Goat Mountain, Mt. Gardner, Mt. Brewer, Charlotte Peak, University Peak, and an unnamed peak north of the Kearsarge Pass, were located as accurately as a small surveyor's compass and the local variation of the needle would allow. These six points form the basis of the map. Each was ascended, and the intervening country sketched, the sketch being afterwards

corrected by numerous compass bearings. All the peaks shown on the map were thus located.

The local magnetic variation on some of these high peaks is very great, being as much as 15° in certain cases. Azimuths taken by compass are almost useless, unless checked by back readings from points whose magnetic variations are known. Hence, in general, a small plane table would probably be as good, or even better, for such work. J. N. LE CONTE.

MAPS OF THE UNITED STATES GEOLOGICAL SURVEY.

Readers of the SIERRA CLUB BULLETIN will be glad to learn that the fine topographical maps of the United States Geological Survey, hitherto procurable only through favor or by personal solicitation, are now offered to the public generally at a merely nominal price — in fact, at no more than the cost of the impression. The following communication, recently received from Mr. H. C. Rizer, Chief Clerk of the Survey, gives all necessary information as to how the maps may be procured:—

"By Congressional enactment, approved February 18, 1897, the topographic and geological maps and atlases of the United States made and published by the Geological Survey must be disposed of through sale.

"The topographic maps are prepared from actual surveys, to serve as a basis for the geologic maps, and show surface elevations, roads, and all necessary physical and cultural details. Each sheet is designated by the name of a principal town, or some prominent natural feature within the district, is sixteen and a half by twenty inches, and covers one sixteenth, one quarter, or the whole of a geographical degree, according as the scale is one, two, or four miles to the inch, the scale varying with the character of the country. About nine hundred such sheets have been printed. THEY WILL BE SOLD AT THE RATE OF FIVE CENTS PER SHEET. Orders for ONE HUNDRED SHEETS, or over, whether for the same or different sheets, will be sold at the rate of two cents per sheet. Proportional charges will be made for the larger size and special maps.

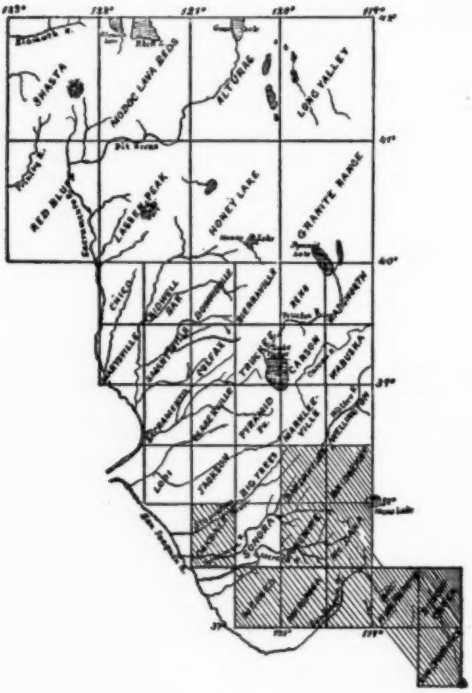
"The folios of the Geologic Atlas of the United States, containing the topographic and the areal, economic, and structural geologic maps, together with suitable textual descriptions of the region, will be sold at prices varying with the size of the publication — usually twenty-five cents.

"Lists of maps and folios and other publications of the Survey will be furnished on application. Remittances must be by money order, made payable to the Director of the United States Geolog-

ical Survey, or in currency (at sender's risk) for the exact amount. Stamps and checks cannot be accepted. Communications should be addressed to:—

"THE DIRECTOR,
"UNITED STATES GEOLOGICAL SURVEY,
"Washington, D. C."

Some forty-one separate atlas sheets of areas in California are already announced as ready for distribution, together with thirteen



in Nevada, sixteen in Arizona, and smaller numbers in Oregon and Washington. For the convenience of those who may wish to order these maps, the completed sheets of the Sierra region, together with some reported as in progress, are represented in the location of their areas and under their descriptive titles, in the accompanying diagram. Work upon the shaded regions is, as yet, incomplete;

but the DARDANELLES sheet, we learn, may soon be expected, and the YOSEMITE sheet awaits only the engraving. It should be observed that all the sheets of the series are of the same size; the eight larger areas, therefore, at the top of the diagram, are presented on a smaller scale. As far as learned, the completed maps of areas in California, not shown in the diagram, are as follows:—

MAPS OF ORDINARY SCALE.		SPECIAL MAPS OF LARGER SCALE.
Anaheim,	Redlands,	Banner Hill,
Camp Mojave,	Redondo,	Genesee,
El Cajon,	San Bernardino,	Grass Valley,
Escondido,	San Francisco,	Indian Valley,
Las Bolsas,	San Pedro,	Nevada City,
Oceanside,	Santa Monica,	Taylorsville,
Pasadena,		

and one large map, combining the topography of four ordinary sheets, entitled Lake Tahoe and Vicinity.

The following folios of the Geologic Atlas for California are announced as ready for distribution, at the uniform price of twenty-five cents each, save the Nevada City folio, which costs fifty cents:—

Placerville,	Marysville,	Nevada City,
Sacramento,	Lassen Peak,	Pyramid Peak,
Jackson,	Smartsville.	

OUR SISTER SOCIETIES.

The SOCIETA ALPINA MERIDIONALE sends us its CALENDARIO for 1897, containing the programmes of the Club and a valuable compilation of data concerning the heights and various ascents of many Alpine summits.

The ALPINE JOURNAL (London) contains an interesting series of accounts of mountain climbing in the Alps, Norway, and New Zealand, and a brief notice of an ascent of Aconcagua (over 24,000 feet) by Zurbriggen, on January 14th. His companion, Mr. Fitzgerald, failed to reach the summit on account of sickness overcoming him at an elevation of 23,000 feet.

Several interesting articles occur in the publications of the geographical societies.

The February number of the NATIONAL GEOGRAPHIC MAGAZINE contains a careful paper, well illustrated, on Crater Lake and the region about, by J. S. Diller, of the United States Geological Survey. The BULLETIN of the American Geographical Society, XXVIII, No. 4, contains a summary of the topographic work of the United States Geological Survey in 1895, by Henry Gannett, a valuable article on Mexico, its geography, geology, fauna, commerce, etc., by Minister Romero, and a brief account of the utmost waters of the Missouri, by J. V. Brower.

The BULLETIN of the Geographical Club of Philadelphia, and the BULLETIN and COMPTES RENDUS of the Société de Geographie contain interesting articles, not, however, this time, in the line of mountain explorations.

We acknowledge, also, the receipt of the BIENNIAL REPORT OF THE BUREAU OF HIGHWAYS, which has to do with a subject not foreign to the interests of the Sierra Club, and of that valuable journal, SCIENCE, containing many notes of interest which it exceeds our space to notice here.

Among other journals received are the transactions of the Massachusetts Horticultural Society for 1896, and the proceedings of the Academy of Natural Sciences of Philadelphia, 1896. (Pt. III.)

BOOK NOTICES.

"A Guide to Chamonix and the Range of Mont Blanc," just issued by John Murray, and from the pen of the veteran mountaineer and author, *Edward Whymper*, is a work far above the ordinary guidebook in merit and interest. It is at the same time a guidebook in the usual sense, and a very interesting history of mountaineering in the region indicated in the title. To every lover of the mountains it will be found more entertaining than a novel, and the pleasure of reading is much enhanced by the excellent and well selected maps and illustrations. Of special interest are the accounts of De Saussuse's ascent of Mont Blanc in 1787, and of the surveys and work of construction of Dr. Janssen's observatory on the glacier crowned summit of Mont Blanc.

"Mountain Observatories in America and Europe," by Edward S. Holden, published by the Smithsonian Institution, is another new book, the scope of which is by no means confined to technical data, but includes a very interesting compilation of many facts and experiences relating to life and exploits at high elevations. It contains also a considerable number of excellent full page illustrations of mountain summit scenery, collated from various sources.

"Further Contributions to the Geology of the Sierra Nevada," by Henry W. Turner, a publication of the United States Geological Survey, will not be without interest to the Sierra traveler, even if not a trained geologist. Though dealing mainly with the petrography of various districts of the Sierra, it contains many observations of a more general character, relating to the history and structure of the Sierra, that will be of interest to the observing mountain climber. For instance, in the account of the "Yosemite Area" (p. 710), the author notes the observation of

"glacial markings close to the water's edge in August, when the water is low, showing how little cutting has been done since the glacial period. The Grand Cañon has here a depth of 5000 feet." Sierra Club members will also be pleased to note that, "a geologic map will be made of the Yosemite area in the near future." Mr. Turner, in referring to the Mt. Dana area, remarks: "The enterprising members of the Sierra Club of San Francisco are familiar with the district, and in several of the BULLETINS of the Club may be found descriptions and good illustrations of the scenery."

"Rocks, Rock Weathering, and Soils," by G. P. Merrill (The Macmillan Co., 66 Fifth avenue, N. Y., price $4.00), is a much more interesting work for general reading than might, perhaps, be inferred from the title. The author is Curator of Geology in the United States National Museum, and deals in a very readable way with the influences at work in the disintegration of rocks. The frequenter of the mountains, who has noted the peculiar and characteristic methods of weathering of the various rock formations, will find it very instructive to see here the causes of these peculiarities in the physical and chemical structure of the rocks. Many illustrations add to the clearness of the explanations, and copious quotations and references increase its value to the more special student. The concluding sections on the influence of forests and on the evil effects of their denudation, should be read by all who desire information on the vital questions of forest preservation and management.

JOHN M. STILLMAN.

SECRETARY'S REPORT.

FROM APRIL 30, 1896, TO APRIL 30, 1897.

The past year of the Sierra Club has been one of quiet growth; its outward signs of activity have not been so many as in former years, but the appreciation of its work has been manifested in various ways. Particularly is this true in reference to the recognition that has been awarded the Club's publications by the older kindred organizations of Europe.

The visit of the Forestry Commission appointed by the National Academy of Sciences to the Pacific Coast last autumn was one of great importance to the Club; and the Directors offered every assistance possible to the Commission in its work, and believe that their efforts were to some purpose.

The Register Boxes prepared for the summer of 1896 were much better adapted than the former ones; but they were not ready soon enough, so that but three were taken out. The following reports of them have been made:—

"Register Box No. 13.—Deposited on the summit of PYRAMID PEAK on the 20th day of July, 1896, by Edward R. Taylor and Henry H. Taylor. The altitude of this summit is 10,020 feet. Panorama is: Dick's Peak, north; portion of Lake Tahoe visible in northeast; Tallac Mountain, northeast to left of Tahoe; Echo Lake, northeast by east; Heather Lake, northeast; Strawberry Valley, south; Desolation Valley, north, running to the east. We came from Gilmore's by way of Susie Lake; leaving at 8:30 A.M., and reaching summit at 2:50 P.M. The day is

delightful, with gentle breeze on summit; cloudless overhead, with some cumulus clouds low down in horizon to eastward; temperature, 90° Fahrenheit."—*Edward R. Taylor.*

Register Box No. 14.—"If you go up Bubb's Cañon to South Cañon, turn and ascend it to its fork, a mile or two above East Lake, follow then the eastern fork to its head in an amphitheatre two or three miles east, you will find yourself at the base of the eastern precipices of a grand mountain that juts northward from the mass of the Kings-Kern Divide. It has a sort of double summit. Upon the northern of the two summits I built a monument and left therein the Sierra Club Cylinder, No. 14. The mountain we called MT. STANFORD, and was on the Club map (I think) as peak 'No. 5.'"—*Bolton C. Brown.*

Register Box No. 16 was deposited on the summit of DICK'S PEAK on Sunday, the 26th day of July, 1896, by Samuel H. Boardman and Elliott McAllister. They reported that they climbed to the summit from Half Moon Lake in one hour and ten minutes; that the panorama showed the headwaters of Rubicon River to west and northwest, the Emerald Bay region to north; Tallac Mountain to east, Pyramid Peak to south; that the altitude is 10,015 feet, being 230 feet higher than Tallac Mountain; that a fine specimen of the *Pinus albicaulis* was found a few feet below the summit; that they had climbed north from Half Moon Lake, up the water-run, and well over the saddle on the ridge, before turning west and directly up to the summit.

Register Box No. 10, deposited on the summit of Mt. Tallac on the 26th day of September, 1894, by Mr. Dorville Libby, was found to be in a bad condition. The Register Box was sound; but the record had been completely filled on both sides of the sheets; the sheets were so broken and so badly torn by reason of the character of the

paper used, that the record was brought back to the Club. A strong linen paper has been adopted for the new cylinder.

During the past few months the best of the Club's photographs have been on exhibition in San Francisco, at Mr. Vickery's, at the University of California, and in Los Angeles. The thanks of the Sierra Club are again due to Mr. Howard Longley of Los Angeles, who has presented another album of photographs taken in the King's River Cañon region.

The total collected for dues, for the year ending April 30, 1897	$826 85
Publications sold up to same date	26 64
	$853 49
Cash deposited to account of Treasurer	$846 85
Balance on hand	6 64
	$853 49

The following are the Directors elected for the ensuing year, at the annual election of April 24, 1897:—

PROF. C. B. BRADLEY, MR. JOHN MUIR,
PROF. GEORGE DAVIDSON, MR. ELLIOTT MCALLISTER,
PRES. DAVID STARR JORDAN, MR. WARREN OLNEY,
PROF. JOSEPH LE CONTE, PROF. J. H. SENGER,
PROF. J. M. STILLMAN.

The officers elected by the Board of Directors will be announced later.

ELLIOTT MCALLISTER,
Secretary.

REPORT OF TREASURER OF SIERRA CLUB.

FROM MAY 1, 1896, TO APRIL 30, 1897.

RECEIPTS.

Cash on hand, May 2, 1896	$242 18
Total cash received from Secretary	824 98
Total	$1,067 16

EXPENDITURES.

Printing	$249 10
Clerk hire	60 00
Rent	110 00
Janitor	12 00
Postage and expressage	76 15
Stationery	20 55
Binding	21 60
Typewriting	4 70
Photographic plates and engraving	106 62
Albums	17 15
Maps	201 95
Brass Tubes and expressage	23 10
Commission on collections	19 90
Incidentals	7 51
	$930 33
Cash on hand	136 83
Total	$1,067 16

HENRY SENGER,
Treasurer.

REGULAR MEMBERS.

ENROLLED SINCE JANUARY, 1894.

This is a continuation of the list published on page 107, Volume I, of the BULLETIN.

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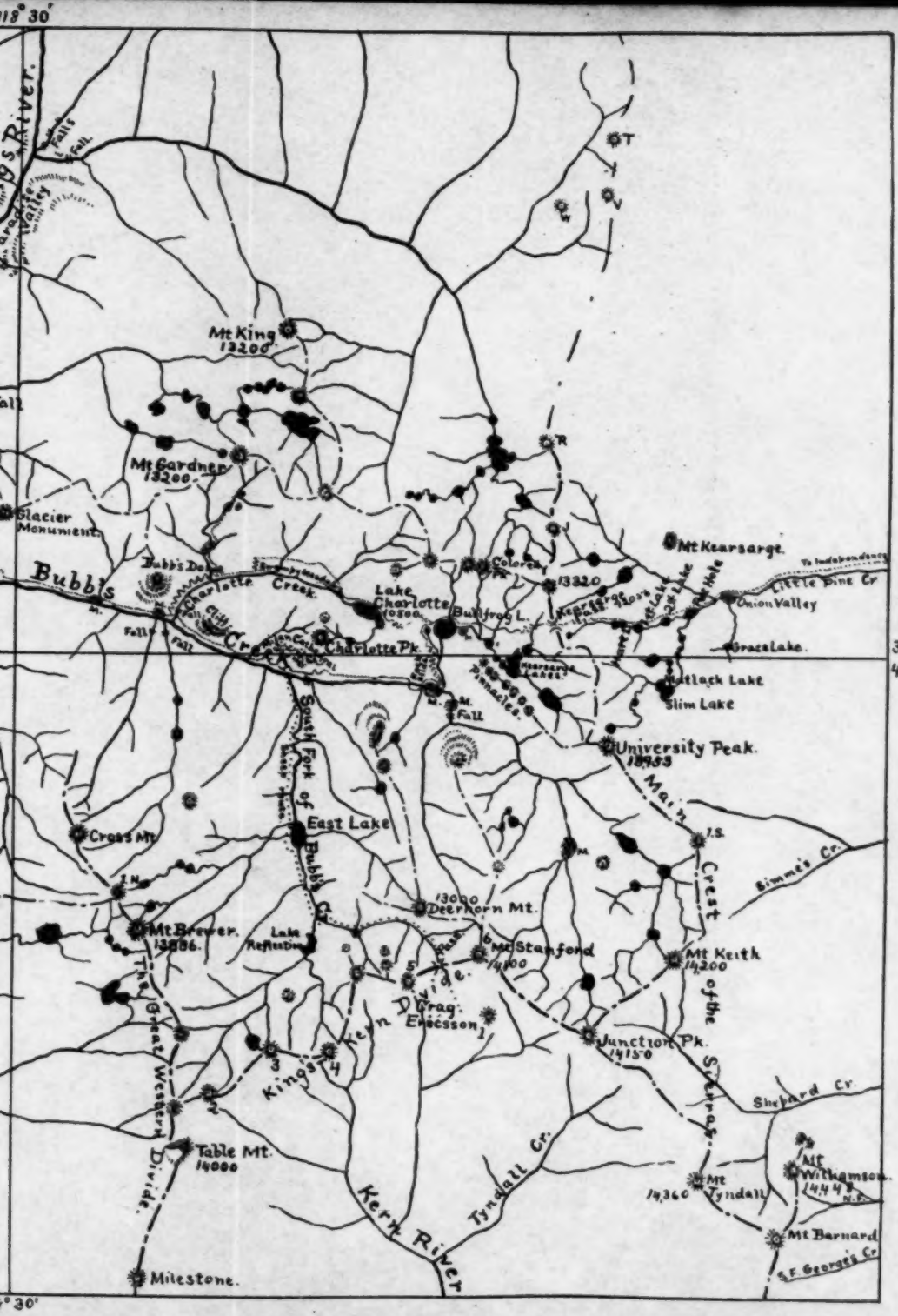
WIELAND, MR. ALBERT G. . Crocker Building, San Francisco
WOOD, DR. THOS. D. . . Stanford University, Cal.
WRIGHT, MR. HOWARD E. . 302 California St., San Francisco

118° 30'
Goat Mt.
Granite Gorge
Fall
Trail to Paradise Val
Paradise Valley
Falls
South Fork of King's River.
Mt Hatching
Granite Gr
Copper Creek
Mist Fall
North Dome
King's River
5000
Canon
Glacier Monument
Cascades
Bubb's
Grand Sentinel
Sphinx
36° 45'
Mt Painter
Gorge
Sugar Loaf Creek
Avalanche Pk
Roaring River
Brewer Cr.
Map
of
Bubb's Creek Basin
and
a portion of the
King's River Cañon
Scale 2 miles = 1 in.
J.N. LeConte May 1896
118° 30'


Mt King 13200
Mt Gardner 13200
Glacier Monument
Bubbs Dome
Bubbs
Charlotte Creek
Cliff Cr
Falls
Lake Charlotte
Charlotte Pk.
Bullfrog L.
Colored
13220
Mt Kearsarge
Kearsarge Pass
Kearsarge Lakes
Little Pine Cr
Onion Valley
Grace Lake
Hatlack Lake
Slim Lake
36° 45'
University Peak
13953
Main Crest
Simmes Cr.
South Fork of East Lake
Cross Mt
Bubbs Cr
13080
Deer Horn Mt.
Mt Brewer
13886
Lake Reflection
Mt Stanford
14200
Mt Keith
14,200
The Great Western Divide
Kern Divide
Trag.
Ericsson
Junction Pk.
14150
Kings
Table Mt.
14000
Milestone
Kern River
Tyndall Cr.
Sheyard Cr.
Mt Tyndall
14,340
Mt Williamson
14495
Mt Barnard
S.F. Georges Cr.